

VicRoads

Review of Engineering Maintenance
Practices for Motorcycle Safety

Stage 1: Workshops (Contract No.0212)

Research Report

November 2005

1 Background

Motorcycle riders are vulnerable road users who are over represented in road crash statistics. Although motorcycles comprise three percent of all vehicles registered and one per cent of vehicle travel in Victoria, motorcycle riders and their passengers accounted for 11 per cent of road fatalities in 2004. Statistics show that, on Melbourne's arterial roads, motorcycle riders are up to 30 times more likely than car drivers to be involved in serious casualty or fatal crashes.

The reasons for this are many and varied. However, road based factors continue to be a major crash risk identified by motorcycle riders.

Aspects of road design and maintenance that create special problems for riders include:

- Potholes
- Loose material (eg gravel, leaves, debris from crashes)
- General road surface deterioration
- Slippery road markings

VicRoads is reviewing road maintenance guidelines and practices to ensure that the issue is being addressed and that there is an improved road environment for riders.

This will be done in 4 stages:

Stage 1: Workshops will be conducted with experienced motorcycle riders.

Stage 2: Existing guidelines and documents will be reviewed in the light of recommendations and issues identified.

Stage 3: Selected sites will be investigated to compare actual maintenance practices with guideline requirements.

Stage 4: A strategy to communicate with road authorities and local government officers and consultants/contractors on the key motorcycling safety issues which are affected by road design, road building and maintenance regimes will be developed and implemented.

This report relates to Stage 1 of the project.

2 Project Objectives

The purpose of this project is to develop, facilitate and report on, workshops with motorcycle riders to identify their concerns covering the full range of issues regarding road quality and maintenance that affect motorcycle rider safety.

3 Methodology

Two workshops were held with experienced motorcycle riders; one in Box Hill (eastern metropolitan Melbourne) and one in Geelong.

Each workshop was of two hours duration and was conducted in the evening to maximise the likelihood of participants being able to attend.

The discussion included the following elements:

- Introduction of participants, VicRoads note-takers and facilitator
- Participants top-of-mind concerns about roads, road surfaces, road maintenance and road design issues
- Video - *A Motorcyclists Perspective* which is included in the motorcycling safety awareness resource *Make Motorcycling Safer* produced by RoadSafe and Saferoads
- Discussion about specific road and maintenance issues, using photographs as prompts
- Identification of the issues of most concern to participants

4 Description of Participants

Geelong

Nine participants attended the workshop which was held at the Mercure Hotel on the evening of Wednesday 9 November 2005.

The participants were drawn from the Geelong area, Anglesea, Freshwater Creek, Barwon Heads, and Ballan.

Seven men and two women attended. Their ages ranged from 32 to 62 years. All rode weekly for recreation and/or commuting purposes on a broad range of motorcycles.

The men had significant riding experience, with most having ridden a motorcycle for more than 30 years. Most had experience on a wide range of roads, including local (some unmade), metropolitan and interstate.

The women had less extensive experience, but were enthusiastic and knowledgeable. Both had been riding at least several times a week for two to three years.

Melbourne

Seven participants attended the workshop at the Tudor Best Western Hotel in Box Hill on the evening of Thursday 10 November 2005. Three people who had confirmed their attendance did not show and another two cancelled on the day of the workshop. This may have been a consequence of bad weather on the day/evening of the workshop.

The participants were drawn from throughout the Melbourne metropolitan area, including inner city, suburban and outer suburban locations.

Four men and three women attended. Their ages ranged from 42 to 60 years. All rode weekly for recreation and/or commuting purposes. All participants rode more than one type of motorcycle including tourers, sports bikes, off-road bikes and scooters.

As with the Geelong participants, most of the men had significant riding experience. All had ridden a motorcycle for at least 20 years.

Again, the women had less extensive experience. While one woman had ridden for 15 years, the others had one and a half to two and a half years riding experience.

5 Results

5.1 Overview

Extensive documentation exists about road surface and maintenance guidelines for motorcycle safety. The aim of this project was to include the rider's perspective: to discuss, prioritise and provide examples.

The issues raised at the two workshops were very similar and have been combined in this report.

5.2 What are the top-of-mind hazards for motorcyclists?

Prior to discussing the issues in detail, participants were asked to identify the main concerns they had about roads, road surfaces, road maintenance and road design issues.

A broad range of issues were identified:

Road surface issues

- Loose gravel
 - > poor resurfacing and maintenance (gravel left over, or job not properly finished)
 - > wash from unsealed driveways or crossroads
 - > build up from cars driving through unsealed shoulders or at intersections
 - > Unsealed shoulders (often no delineation between road and shoulder. This could be resolved by use of different coloured gravel or white line on edge of road)
 - > Gravel on corners/bends used as part of maintenance eg Turtons Track, Otways
- Poor cleaning up after roadworks or crashes
- Potholes and tree roots
- Bad drainage (wet and slippery roads)
- Corrugation, grooving, rutting, wheel tracks from heavy vehicles
- Unrepaired or badly repaired areas (eg crack sealing or slippery tar without any grip (flushing))
- Tram tracks in inner suburban areas, made worse by:
 - > Surface between tracks which is different to rest of road surface (eg wood, concrete or bluestone)
 - > Corrugation and tram tracks together are a serious problem
- Mud and cow pats in rural areas
- Metal surfaces such as manhole covers which usually sit either above or below the road surface (it was noted that an audit is being conducted in Geelong funded by TAC and RoadSafe Barwon Inc.)
- Painted surfaces (discussion about various types of paint and conclusion that those with more 'grip' are more expensive and therefore used less frequently)

- Covering painted white lines and other road markings (these can be very slippery in wet conditions). Painting over lines with tar is particularly problematic, because the 'shiny' lines are visible in dark or wet conditions and it is difficult to determine where the lane is. Riders prefer a method which removes the painted markings by burning, sand blasting or grinding to ensure the resulting surface is flush with the road and not slippery
- Raised surfaces on road eg reflector delineators in centre of roads and on corners ('cat eyes' or Raised Pavement Markers or Raised Reflective Pavement Markers). The view was expressed that those which are flush with the road are much better but also more expensive

Spillages and build up on road

- Spillage and build up of oil/diesel on road especially at roundabouts and intersections (some substances more problematic eg diesel/urea because difficult to see)
- Oil pooling, leaking radiators, diesel, coolant (evaporates and leaves chemical on road). Need to educate drivers about the impact on motorcyclists
- Spills often cleaned up to standard for car safety, not adequate for motorcycle safety

Fencing

- Wire rope barriers of concern because motorcyclists are not protected from the posts. The number and frequency of posts is the greatest issue
- Armco fencing also a concern (double Armco fencing and plastic capping safer)

Roadside furniture

- Poles and other objects too close to the road (eg Bridge Road Richmond)

Railway crossings

- A particular problem in conjunction with poor road camber (eg North Geelong)

Signage

- Lack of signage, particularly when roadworks completed and remaining debris or changed traffic conditions (eg new pedestrian refuge in Anglesea)
- Prefer signs to be as specific as possible (eg gravel on road)
- Suggested use of temporary signs in interim before road is repaired
- Advisory signs are liked by motorcyclists, but care must be taken in relation to placement (not too close to road, in dangerous locations etc)

Education and Training (Melbourne group only)

- Need to educate inexperienced riders about road issues (what to look for, how to manage risk, what are dangerous issues eg cobblestones and braking)
- An instructional video/DVD would be good (similar to that shown in the Workshop)
- A lot of good training is currently available but may need to be better publicised
- Some riders have a bad attitude (a culture of safe riding needs to be encouraged)
- Need to use inexperienced riders as the target for maintenance standards (ie lowest common denominator)

5.3 Views about specific issues

A number of specific road surface and maintenance issues were discussed in depth. The table below outlines respondents' comments and concerns about each issue, priorities for maintenance and possible solutions.

Riders views about specific issues		
Potholes	Priorities	Solutions
<ul style="list-style-type: none"> • Potholes are biggest problem when can't be seen or avoided • Depends on depth and width, with larger potholes are a bigger problem • Anything wider than tyre width is a problem and will affect balance • Motorcycle tyre surface on road is about size of a match box • Potholes are a big problem on bends, particularly when they coincide with the rider's line through the corner • If have capacity to change line of bike, can have capacity to throw rider • Stability issues 1. wheel burying and 2. avoidance which can cause secondary danger eg into oncoming traffic or into gravel • Potholes can be obscured when driving behind a group of motorcycles or another vehicle, and riders need to rely on the motorcyclist in front to warn the group • When potholes are repaired the surface is often deliberately made higher for cars to 'squash' flush with road (overfilled holes can be worse than potholes for rider) • Patches are often not adequate, sometimes too soft and can create a high bump at exit side of repair owing to car traffic • Need to also look at debris on road near pothole eg gravel which can exacerbate problem • Signs are good as temporary measures prior to repairs, but should only be used where substantial problems exist. Riders can become complacent if signs do not mean anything • Tree roots are reverse potholes! Also a big problem 	<ul style="list-style-type: none"> • On bends and corners • In areas where pothole can not be avoided or where avoidance is dangerous • In areas that are in the riders 'line' • Deep potholes • Where braking occurs eg intersections • Where gravel is also a problem 	<ul style="list-style-type: none"> • Fix potholes ASAP that are on bends, deep and at places where braking occurs • Improve visibility. If can see potholes it is easier to avoid (experienced riders) • Fluorescent paint around ring of pothole is a good temporary measure to improve visibility • Provide temporary 'damaged road' signs prior to repairs • Provide suitable speed advisory signs • Improve and endorse standards eg quality for repairs. Potholes should be levelled out and repaired properly not just add bitumen on top • Adequate auditing of repairs to ensure work completed to standard • Make Hotline effective and gain credibility with riders to make sure hazards are reported and addressed • Address funding issues to ensure adequate maintenance

Gravel and loose stones

- Problems arise when rider doesn't see the loose gravel or stones on a bend or when not expected
- Motorcyclists have limited control when gravel is on the road and this results in lack of stability, even at low speeds
- Gravel and stones washing from driveways and unsealed roads onto asphalted roads are a major issue
- Build-up on road from cars
- Left over from repairs
- Sweeping gravel can leave a large lump of loose gravel on the side of the road
- Road sweeping and cleaning often are not adequate as gravel can be back the next day if it rains
- Roadworks including grading of shoulder leaves gravel on shoulder which washes back onto road when rains
- Need delineation to be able to see edge of road/shoulder, problem when gravel same color as road
- Most councils have a by-law about gravel wash but may not be enforced
- Example provided of Blue Circle/quarry trucks leaving mud/slush 1 km on road made which was made worse after rain. Initially this practice stopped, but it appears to have resumed and raises need for enforcement and prosecution
- Example provided of 120 day timeframe to get loose gravel fixed (Geelong area) – it was reported to Council twice, until finally the motorcyclist took a bucket of gravel to the Minister's office and subsequently spoke to Minister's advisor. The issue was fixed in 24 hours
- Noted by one participant that SA legislates to seal shoulders

Priorities

- On bends and corners
- After roadworks
- Where unmade roads/driveways meet made roads
- Where shadows from trees make it difficult to see gravel

Solutions

- Need process to log problems and get something done
- The same level of urgency is required to clean up gravel as for oil and other spillages
- To prevent wash from driveways and unsealed roads. Need to legislate to seal driveways/side roads at least 5-10 metres back from road (design issue)
- Steep driveways (more of an issue because can't hold gravel back)
- Property owner responsibility/education
- Road design issues (angle of roadway can minimise gravel run-off)
- Proper drainage for water run-off eg kerb and channel (concrete guttering along road and partly up driveway where unsealed road/driveway intersects with sealed road)
- White line at edge of road to show delineation between road and unmade surface
- Different coloured gravel would be helpful
- Good procedures and audits for roadworks completion and maintenance eg loose stones should be avoided
- Better education for engineers and maintenance workers

Road markings and slippery surfaces - paint

- Painted road markings are more of a problem for motorcyclists when wet and slippery
- Larger painted areas and painted areas at intersections (eg arrows and double white lines, criss-crossing) are the biggest problem
- Yellow crosswalks are more slippery than bitumen but not as much as white lines or white turning arrows
- Delineation is good if not slippery, rumble strips are good as need to know where road edge is
- Tactile edgelines (which make a noise and wake drowsy driver) also have good grip
- Layers of paint are a problem because it builds up higher than road surface, removal is also an issue
- Changing road markings is very problematic
- Painting over/tarring over is very slippery
- Removal of painted surfaces is also a problem (can create grooves and ridges)
- New road markings can cause confusion re line of traffic as don't know where lane is
- Problem with variation between paint standards of VR and LGAs – VR is getting better
- Paint used at race tracks is excellent (very good grip)

Priorities

- At intersections and where braking
- Larger painted areas
- Where multiple hazards exist

Solutions

- Problems with painted surfaces can be addressed through use of anti skid paint (level 9 most expensive, but best for motorcycles).
- Skid resistant paint should be the standard for road markings, particularly for large painted areas
- Grinding off, sand-blasting or burning are best solutions for removing road markings (needs to be flush with road surface, skid resistant, good quality removal)
- Standards for road markings and removal need to be audited and enforced

Road markings and slippery surfaces – metal plates

- Metal on road is very slippery – it may as well be oil!
- Roadworks plates are worse than black ice
- Biggest problems occur on bends because rider loses line and can end up on the wrong side of the road
- Joins and expansion joints – problems when braking or when on corner
- Sunken man holes (particularly frequent in Adelaide and NSW)
- Silent policemen
- Example: Coming off Eastern Freeway at Springvale Road is a problem – manhole and bridge expansion joint
- Example: Expansion joints on bridges are a big issue such as the Great Ocean Road

Priorities

- On bends and corners
- Where braking occurs

Solutions

- Don't use them!
 - Cover with bitumen or other non-slippery surface
 - Again, use Hotline for motorcyclists to report problems (this should be on-line as well as telephone)
-

Road markings and slippery surfaces

– oil, grease and spillages

Road markings and slippery surfaces	Priorities	Solutions
<ul style="list-style-type: none"> • Issues include spillage of oil and other substances, build up of grease on road, especially at intersections and inadequate clean up after crashes and spillages • Issue at crash scenes with emergency services not cleaning up the site to an acceptable standard for motorcyclists and often sand is just thrown down without being rubbed in • Generally, the standard of clean up is for cars not motorcycles • Oil build up (from drips from cars) occurs especially at busy intersections eg Swan St and Punt Rd, Richmond • The curves and corners are the greatest risk especially with spillages eg the roundabout at Breakwater has a sharp turn • In general, oil spills are cleaned up very quickly (compared with gravel spills or build up which are usually slow to be removed) 	<ul style="list-style-type: none"> • Immediate spills clean up • Roundabouts (camber means trucks spill diesel and very dangerous for motorcycles) • Substances that riders can't see are most dangerous 	<ul style="list-style-type: none"> • Standard of spillage and crash site clean up needs to be at an appropriate level for motorcycles • Standard procedure needed which can be checked by engineer to confirm road is safe (not to be left to emergency services) • Consider greater enforcement and penalising motorists for spillage • Everyday build up needs regular treatment and cleaning with more emphasis on roundabouts • Need surface/pavement at a grade to be able to absorb oil and grease better • Greater level of auditing of clean up practices is required

Road markings and slippery surfaces – tram tracks and railway crossings

Road markings and slippery surfaces – tram tracks and railway crossings	Priorities	Solutions
<ul style="list-style-type: none"> • Motorcyclists plan routes to avoid tram tracks wherever possible • Additional problems occur where the road surface breaks away from the tracks or the surface between the tracks is corrugated or slippery • Concrete barriers separating the road from the tram tracks are very dangerous because riders need a place to go to divert from any hazards • Trams use sand for emergency stopping which can blow onto the road and is dangerous for motorcyclists • Problems exacerbated by poor visibility in that the tracks are hard to see at night and in wet weather • Riders should be able to use tram track pavement • Problem areas identified include Burwood Hwy/Warrigal Rd, St Kilda Road and Bridge Road near Church Street heading out of city • Example: Corio Quay was identified by participants in the Geelong group as a potential blackspot candidate due to the 'bumps' and bends and descent in the railway tracks. It was suggested that a bridge be built over the tracks for motorcyclists, due to the road being so bad 	<ul style="list-style-type: none"> • Multiple hazards in single location • Poor visibility 	<ul style="list-style-type: none"> • Separation is only real solution • Provide better visibility of concrete separation when used • Use skid resistant paint rather than concrete • Resurface corrugation and poor surface between and around tracks • Address multiple hazard locations

**Road markings and slippery surfaces
– crack sealing, crocodile cracking**

- Like gravel and potholes, crack sealing and crocodile cracking is a big problem for skid resistance
- May not see in wet or in poor light
- Issue regarding traction, especially in wet when can't see it properly
- A lot of roads have this treatment (Richmond was highlighted as an area of particular concern)
- Photo demonstrates good place to 'die' with multiple hazards including damp under underpass, fence, poles, road surface, concrete

Priorities

- Low visibility
- Wet or damp conditions
- Bends and corners
- Large areas of treatment

Solutions

- Should repair cracks and whole road surfaces properly (not band-aid treatments)
- Should definitely not be used as a treatment over a large area or on corners
- Use a gripper sealant
- If it's fixed for motorcyclists, it's fixed for all road users!
- Provide appropriate signage eg slippery when wet, but place in safe locations

**Road markings and slippery surfaces
– rutting, corrugation**

- Corrugation is a problem because motorcycle tyres can get stuck in groove and become trapped
- Like tram tracks, caused by heavy vehicles at traffic lights and on highways
- Example: Hume Hwy near Ring Road where there are massive grooves 20-30 cm deep for approximately 40 metres
- Example: Great Ocean Road and a potential crash with a caravan that was stuck in groove on a bend in opposing direction to the motorcyclist

Priorities

- Bends and corners
- Low visibility
- Multiple hazards

Solutions

- Fix the road!
- Signs are better than nothing
- Even if a procedure is in place, we have to be realistic as funding is an issue

Road markings and slippery surfaces
– road grooving

- Vertical or parallel grooving (parallel to direction of traffic flow) a big problem for motorcyclists because tyres can get stuck in groove
- Horizontal (transverse) grooving is generally not a problem and is helpful to remove water from road

Priorities

- All areas where these exist

Solutions

- Avoid parallel grooving
- Both types should be signed using a specific 'grooving' sign
- 'Slippery when wet' sign is non-specific and riders do not know what to look for

Road markings and slippery surfaces
– poor drainage, flooding, frost

- Dangerous if road is dry and then suddenly wet (unexpected)
- Water draining/pooling across corner is a problem
- Rain across road is an issue
- Frost is an isolated problem and needs signage
- Moss is an issue on Great Ocean Road and in forests caused by overhanging canopy. Also light and shadows from trees disguise road surfaces
- Issue arises when roads are not cleaned regularly and rely on through traffic to clean
- Roads are better now than a few years ago because of improved materials and water drainage

Priorities

- Bends and corners
- Damp conditions

Solutions

- Fix drainage problems
- Sign if prone to flooding, frost etc. Be specific so that riders know what to look for eg flashing signs on Calder Highway to warn of frost
- Regular cleaning of roads, especially after storms
- Guidelines for water pipe damage exist, so these should be enforced

Road markings and slippery surfaces
– cobblestones and other uneven road treatments

- Bricks and bluestones are slippery, shiny and uneven
 - Bricks generally slipperier than bluestone
 - Worse in wet
 - Problematic if exists at intersection/roundabouts
 - Adverse or negative camber in conjunction with cobblestones causes problems
 - Often occur at end of street, where motorcyclist brakes
 - Motorcyclists will ride around speed humps to avoid
-

Priorities

- Areas where braking occurs eg intersections
- At roundabouts

Solutions

- Do not use in areas where braking occurs or at roundabouts
- Utilise non-slippery treatments or surfaces

Roadworks (during and after completion)	Priorities	Solutions
<ul style="list-style-type: none"> • Quality of job very important for motorcyclists • Need flat, skid resistant and consistent surfaces • At T intersections, it is important to seal shoulders and provide sealed overtaking lane at right hand turns to prevent riders overtaking on gravel • Issue regarding cleaning up after roadworks - Who is checking contractors' work compliance with standards/requirements? • Concern about changed road conditions after roadworks • Sufficient signage is provided during roadworks but not after roadworks completed • Signs needed after roadworks are completed to warn of new road conditions. • Example: Problem with maintenance workers/engineers understanding and being aware of motorcycle safety issues in Yarra Ranges • Example: Changed road conditions with no warning on Great Ocean Road at Angelsea after pedestrian refuge works were completed 	<ul style="list-style-type: none"> • On bends and corners • Changed road conditions 	<ul style="list-style-type: none"> • Signage during roadworks • Signage after roadworks to warn of changed road conditions • Proper clean up after roadworks completed • Educate engineers/maintenance contractors about standards • Auditing of completed roadworks to ensure compliance and penalties applied

Signage

- Motorcyclists value good, informative road signs which provide specific information about hazards
- Inconsistent road signs are a problem such as advisory speed signs which do not adequately reflect road conditions are often these signs are ignored by riders, but sometimes they correctly reflect the conditions and difficulties can then arise
- Example: In King Valley signs indicate difficult conditions when the road is excellent, however, later on the road becomes more hazardous. Signs need to be better positioned
- Any correct advisory signs are helpful eg 'Slippery when wet' and 'Grooving'
- Need other specific signs eg hair pin bends
- Signs must be appropriately placed, far enough from road and not on sharp corners etc
- Riders like the RoadSafe signs for 'hot spots' and motorcyclist advisory signs for drivers
- Motorcyclists see 'High Use Motorcycle Area' as good sign. Example: VicRoads Road Safety Department is willing to use signs, however, VicRoads South Western Region is not, due to safety issues regarding the poles
- 'High use motorcycle area' sign used in Murrindindi and Yarra Ranges Shires(it is seen as very effective and welcomed by motorcyclists)
- Motorcycle symbol good for cars too, as indicates potential problems

Priorities

- To indicate specific hazards
- Only where hazards are real otherwise not heeded

Solutions

- More specific signs
 - Temporary signs good too to warn of road surface problems prior to maintenance
-

Fences and barriers

- Concerned about proximity to the road/riding line and no escape route
- Concerned about anything that they could collide with
- Big concern with Wire Rope Barriers (WRB's), fences with a lot of solid posts and other non-frangible materials
- Preferred fence is at Phillip Island which is a graded road and tyres barriers. One participant reported that a cover for wire rope is available and cost effective and would be beneficial for both cars and motorcycles
- Single Armco is a problem, but double Armco with plastic capping is another good solution
- WRB issues:
 - > no opportunity to get through barrier/post (like a knife edge)
 - > good for cars (have saved lives)
 - > particular concerns when on bends, too close to road
 - > Kinglake/St Andrews Road a problem
 - > can improve with plastic covers

Priorities

- On bends and corners
- When close to road/riding line

Solutions

- Use modern materials which are frangible
- Safer options are double Armco with plastic capping or plastic covers for WRB
- Need to cover posts or reduce number and allow space between wire and ground to allow motorcyclists to go underneath
- Soft vegetation in front could help to slow down motorcycles

Clear zones and roadside hazards	Priorities	Solutions
<ul style="list-style-type: none"> • Concerned about proximity of poles etc to road and riding line • Suitable distance from roadside depends on speed zone and curvature of road • Poles etc need to be forgiving (frangible/breakable) • Roundabouts cause particular issues: <ul style="list-style-type: none"> > arrow signs are too close to road > planting of trees/rocks prevent clear sight lines > example: Wimmera St Box Hill has poor camber, a bad corner and now signage too close to the road 	<ul style="list-style-type: none"> • Bends and corners • Roundabouts 	<ul style="list-style-type: none"> • Need to accept what is currently there, but when replaced, should be better positioned and better materials to account for motorcyclists • New materials should be frangible • Electricity and other utilities should be underground where possible to reduce need for poles • Consider real need for signs and whether they are always necessary

Other road design issues

- Positive camber/curvature important for motorcyclists to maintain upright position
- If camber not right, angle and G-Force throws rider off-line
- Camber and design causes many problems for motorcyclists including shorter riders trying to reach the ground when stopped
- Roads often designed for trucks and cars with no consideration for motorcycles
- Should be designed for safest outcome for all vehicles
- Example: Calder Road and Omeo Road have been designed well. Engineers designed Omeo Road to accommodate logging truck traffic and safety for all vehicles
- Roundabouts (vegetation/plantings obstruct view/restrict sightlines, kerb can be too high and not 'mountable')
- Road bricks (old technology, raised are a problem for motorcyclists)
- Raised humps (stability for riders is a big issue)
- Issue at Local Council borders with quality of roads and repairs varying considerably (relates to priorities and funding)

Priorities

- Bends and corners
- Roundabouts
- Routes frequently used by motorcyclists

Solutions

- Communication to engineers and maintenance workers on good practice and motorcycle safety issues
 - Provide signs advising motorcyclists about areas with negative camber
-

5.4 Summary of possible solutions

This section provides a summary of the issues outlined in section 5.3 above.

Potholes

- Prioritise repairing of potholes that are deep, on bends and at places where braking occurs or avoidance can throw the rider into a dangerous situation
- Provide fluorescent paint around ring of pothole as a temporary measure to improve visibility
- Provide temporary 'damaged road' signs prior to repairs being conducted
- Provide suitable speed advisory signs prior to repairs being conducted

Gravel and loose stones

- Provide the same level of priority to clean up gravel as for oil and other spillages
- Require sealing driveways/side roads at least 5-10 metres back from road to prevent wash from driveways and unsealed roads
- Ensure property owners are aware of their obligations in relation to sealing unmade driveways where these join sealed roads
- Design roads to minimise gravel run-off and provide proper drainage for water run-off with kerb and channel (concrete guttering along road and partly up driveway where unsealed road/driveway intersects with sealed road)
- Provide white lines at edge of road to show delineation between road and unmade shoulder surface
- Use different coloured gravel to improve visibility

Painted road markings

- Use anti-skid paint wherever possible
- Priority should be given to large painted areas and areas frequently used by motorcycles
- Grinding, sand-blasting or burning are the best solutions for removing road markings (outcome needs to be flush with road surface and skid resistant)

Metal plates

- Cover with bitumen or other non-slippery surface

Oil, grease and spillages

- Clean up of crash sites and spillages should be to an appropriate standard for motorcycle safety
- The clean up procedure should be checked by an engineer to confirm road is safe
- Consider greater enforcement and penalising of motorists for spillage
- Everyday build up needs regular treatment and cleaning, particularly at roundabouts
- Road surface/pavement should be capable of absorbing oil and grease better

Tram tracks and rail crossings

- Separation is the only real solution
- Provide better visibility of concrete separation when used for delineation
- Use skid resistant paint rather than concrete
- Resurface corrugation and poor surface between and around tracks

Crack sealing

- Should repair cracks and whole road surfaces properly and not use band-aid treatments
- Crack sealing should definitely not be used as a treatment over a large area or on corners
- Mix sealant with something to provide grip
- Provide appropriate signage such as 'slippery when wet', but place in safe locations

Rutting and corrugation

- Prioritise repairs in areas frequently used by motorcyclists
- Provide signs as a temporary measure

Road grooving

- Avoid parallel grooving
- All grooving (parallel and transverse) should be signed using a specific 'grooving' sign

Drainage, flooding, frost

- Fix drainage problems in areas frequently used by motorcyclists
- Sign if prone to flooding, frost etc and be specific so that riders know what to look for
- Regularly clean roads frequently used by motorcyclists, especially after storms

Uneven road treatments (cobblestones, bricks etc)

- Do not use in areas where braking occurs or at roundabouts
- Utilise non-slippery treatments or surfaces

Roadworks

- Continue to provide signage during roadworks
- Provide signage after roadworks to warn of changed road conditions where these could adversely affect motorcyclists
- Ensure adequate clean up for motorcycles after roadworks are completed

Signage

- Provide more signs to warn of specific hazards (eg gravel, grooving, corrugation, negative camber)
- Provide temporary signs to warn of road surface problems prior to maintenance
- Consider safe placement and real need for signs and whether they are always necessary

Fences and barriers

- Use safer options such as double Armco with plastic capping or plastic covers for wire rope barriers
- Use materials which are frangible
- Where suitable, provide soft vegetation in front of fences/barriers

Clear zones and roadside hazards

- When replaced or in new developments, items should be better positioned using frangible materials
- Electricity and other utilities should be underground where possible to reduce need for poles

General issues

- Provide better education for engineers and maintenance workers in relation to road design and maintenance issues and the impact on motorcyclists
- Improve standards for the quality of road repairs, maintenance and clean up to address motorcyclists' needs
- Prioritise repairs in multiple hazard locations
- Ensure adequate auditing of repairs and clean up to ensure work completed to acceptable standard
- Penalise contractors and maintenance workers when work not completed to acceptable standard
- Make Hotline effective and gain credibility with riders to make sure hazards are reported and addressed and feedback provided to the respondent (consider Internet/email version of Hotline)
- Allow reporting of motorcycle hazards via internet with appropriate feedback reporting
- If it's fixed for motorcyclists, it's fixed for all road users!

5.5 Prioritising issues

After discussing the issues in detail, participants were asked to identify the issues of most concern to them.

The following issues were identified at each workshop:

Geelong

- Educate and communicate with operators to improve the finish and clean up of road construction and maintenance jobs. Audit completed works to ensure compliance
- Improve hazard visibility and early warning of hazards. Provide signage and other treatments such as fluorescent paint or coloured gravel
- Ensure that the Hotline for reporting hazards for motorcycles is effective and credible with motorcyclists. Allow reporting through a website to provide feedback to the reporter
- Clean up gravel build up on bends and seal of driveway and entries
- Improve uneven road surfaces (tree roots, potholes, corrugation/rutting, manholes, railway crossings)
- Avoid placing fixed obstacles/objects in clear zones and plan for the future
- With road resurfacing, utilise up-to-date skid resistant techniques and materials
- Provide more consistent advice on bends with regard to hazards related to maintenance and in general

Box Hill

- Emphasis should be on inexperienced riders (in the first 18 months) with improved education and attitude and by providing driver education on road surfaces
- Improve quality of road repairs and clean up of debris following repairs
- Prevent and improve unseen variations in road surfaces
- Provide more run-off areas and sealed shoulders
- Roadside furniture should be minimised or placed outside clear zone
- Road camber needs to be positive for motorcyclists
- Improve consistency of speed advisory signs eg on hairpin bends
- Improve skid resistance of road surfaces eg paint, slippery surfaces, bricks/stones
- Ensure that the Hotline for reporting hazards for motorcycles is advertised and is effective and credible with motorcyclists

Feedback and ongoing communication

Both groups requested ongoing communication about what is happening with this project. Respondents indicated that they and others would be more likely to attend similar workshops in the future if they knew the outcomes of their involvement. There is a fear that this could be a waste of time. Feedback and regular communication adds to the credibility of these processes and will facilitate more people becoming involved, particularly riders under 30 years of age.