



MAINTENANCE ENGINEERING STANDARDS TO FULFIL THE LEGAL DUTY OF ROAD AUTHORITIES TOWARDS SAFE ROADS

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THREE THEMES

- Legal aspects
- Maintenance standards
- Cases

WHY MAINTENANCE AND NOT DESIGN OF ROADS?

- The provision of public infrastructure such as roads is part of the civil political processes where the priorities of social needs are traded off against the limited resources through the executive and legislative branches of government. This is discretionary action, based on policies and mandates of the government of the day.
- The maintenance of public infrastructure such as roads that was established through discretionary action, becomes obligatory until decisions are taken to abandon such infrastructure.

LEGAL ASPECTS OF ROAD MANAGEMENT

- Legal authority to provide roads: mandate
- Legal duty towards road users: obligations

LEGAL ASPECTS OF ROAD MANAGEMENT

- Legal authority to provide roads: mandate

Enabling legislation

- Constitution
 - National road and transport acts
 - Provincial roads and transport acts
 - Municipal structures act
- Legal duty towards road users: obligations

LEGAL ASPECTS OF ROAD MANAGEMENT

- Legal authority to provide roads: mandate
- Legal duty towards road users: obligations
 - Basic rights
 - Policy
 - Legislation
 - Common law
 - Case law

BASIC RIGHTS

The right to road safety

- Section 11 of the Constitution provides that: 'Everyone has the right to life', while s 12(1)(c) states that everyone has the right to freedom and security of the person, which includes the right 'to be free from all forms of violence from either public or private sources'. Section 21(1) guarantees the right to freedom of movement. I submit that the conjunctive reading of these sections lay the basis for a right to live free from the threat of death and debilitating injury. It, in my view, particularly obligates the state to ensure that its citizens are not exposed to violence, which originates from the use of roads. (Klopper, 2018. de Rebus)

BASIC RIGHTS

The right to road safety (continued)

- Based on the Constitution and internationally accepted principles, I submit that South Africans have a right to live free from debilitating injury and threats, which impinge on their right to life.
- In the context of road travel this right translates into a governmental obligation to protect its citizen's right to safety. Or stated differently, to take practical, pro-active and efficient action to ensure effective road safety. (Klopper, 2018. de Rebus)

POLICY

- Policy defines the legal convictions of society, and the expectations or good values (*boni mores*). Loubser, *et al* (2009:147) state “it is public policy that determines whether a legal duty for the purposes of wrongfulness exists”.
- The *Moving South Africa* project was designed to produce a programme for strategic action that extends the *policy* in the Transport White Paper into a long-term strategy.
 - Provide safe, reliable, effective, efficient and fully integrated transport operations and infrastructure which will best meet the needs of freight and passenger customers at improving levels of service and cost in a fashion which supports government strategies for economic and social development whilst being environmentally and economically sustainable (Department of Transport, 1998).
- South Africa subscribed to the WHO Organization Decade of Action for Road Safety 2011 – 2020 strategy and the goal to reduce road fatalities by 50% by 2020. This is now considered policy.

NATIONAL ROAD SAFETY STRATEGY 2016 TO 2030



The Vision of the National Road Safety Strategy:

“Safe and secure roads”

The Mission of the National Road Safety Strategy:

- Reducing the number of fatal and serious crashes in South Africa, by 50% from the 2010 base, by 2030
- To ensure safety on our roads, promote responsible road usage and to save lives
- To ensure an acceptable level of quality in road traffic management, with emphasis on road safety, with specific focus on the South African rural and urban road network



LEGISLATION

National Roads and SANRAL Act (SANRAL and NRA) 7 of 1998.

- The functions of SANRAL are stated in section 25 (1):

25. (1) The Agency, within the framework of government policy, is responsible for, and is hereby given power to perform, all strategic planning with regard to the South African national roads system, as well as the planning, design, construction, operation, management, control, **maintenance** and rehabilitation of national roads for the Republic.

- Its legal duty to provide safe roads is highlighted in section 26 (e):

26. In addition to the Agency's main powers and functions under section 25, the Agency is competent (e) to provide, establish, erect and maintain facilities on national roads for the **convenience and safety of road users**.

- In section 39 (3), an obligation is set:

39 (3) The Agency must determine its business and financial plan and strategic plan and the standards and criteria for road design and construction and **for road safety** within the framework of the national roads policy as determined by the Government and published in terms of subsection (1)

PROVINCIAL LEGISLATION

- Mpumalanga Roads Act 1 of 2008

3.(1) The Member of the Executive Council must, within available resources, develop, declare, implement, administer and promote the Provincial road network in terms of effective, open, accountable and co-operative governance and in accordance with National and Provincial norms, standards and practices in order to

(a) achieve **optimal road safety standards** within the Province;

PROVINCIAL LEGISLATION

KwaZulu-Natal Provincial Roads Act 4 of 2001

3 (1) The Minister must develop, declare, implement, administer and promote the provincial road network in terms of effective, open, accountable and co-operative governance and in accordance with national and provincial norms, standards and practices to -

- (a) achieve optimal **road safety standards** within the Province;
- (b) protect and maintain provincial road network assets;
- (c) achieve the progressive realisation of equitable road access to all communities within the Province;
- (d) ensure efficient and cost-effective management and control of the provincial road network; and
- (e) maintain and protect the environment.

PROVINCIAL LEGISLATION

- KwaZulu-Natal Provincial Roads Act 4 of 2001

9(3) The Minister is not liable for any claim for damages arising from the existence, construction, use or maintenance of any provincial road, except where the loss or damage was caused by the wilful or negligent act or omission of an official.

INTERNATIONAL LEGISLATION

The UK Highways Act 1980 in section 41 (1) reads:

“The authority who are (sic) for the time being the highway authority for a highway maintainable at the public expense are under a duty, subject to subsections (2) and (3) below, to maintain the highway”

INTERNATIONAL LEGISLATION

Article 42 of Japanese Road Law states that road administrators “shall maintain and repair roads such that they are kept in good condition, and shall make it a point to prevent general traffic from experiencing hindrances.”

Article 2 of The State Redress Law stipulates that “When any defects in the construction or management of roads, rivers or other public structures have caused people to suffer damages, the national government or public organization(s) are liable for the damages

Hirasawa, Asano and Seito in the Proceedings of the Eastern Asia Society for Transportation Studies (Hirasawa, *et al*, 2005):

COMMON LAW

- Lord Atkin in *Donoghue vs Stevenson* (1932)
-You must take reasonable care to avoid acts or omissions which you can reasonably foresee would be likely to injure your neighbour. Who, then, in law, is your neighbour? The answer seems to be persons who are closely and directly affected by your act that you ought reasonably to have them in your contemplation to be affected, when you are directing your mind to the acts or omissions that are called into question.
- In the case of a road authority, the persons who are closely and directly affected by their actions are the road user in its widest meaning, driver of any legal vehicle, passenger, pedestrian, cyclist, adjacent land owners, owners of services in or over the road reserve, and even public institutions

CASE LAW

Graham v Cape Metropolitan Council 1999 (3) SA 356 (C). van Deventer J:

The legal principles to be applied in cases of this kind may be summarised as follows:

- Wrongfulness in terms of the sense of justice and legal convictions of the community now applies to omissions by a public authority. **A duty of care towards road users should apply to the controlling public authority unless there is a valid basis for its exclusion.** However, as this, is whether the sense of justice of the community would view the failure of the local authority to take positive action as wrongful, subject to the qualification that the local authority is not required to do more than may be reasonably expected.

CONSEQUENCES OF FAILURES TO EXECUTE LEGAL DUTY ARE CLAIMS IN DELICT

A delict is an **act** that is **wrongful**, for which the defendant must be at **fault** that **causes damages** to the plaintiff.

Claims against road authorities for defects in the road environment are based on the elements of delict: the act, wrongfulness, fault, causation and damage. (Neethling, *et al*, 2001)

- **Legal duty** is a component of **wrongfulness**,
- **fault** can be allocated to each of the parties involved in an accident,
- **causation** is a factual analysis or reconstruction of the accident and
- **damage** involves the amount of money involved.

THE ACT

- Positive act
- Omission
- Act by own employees:
 - vicarious liability if acting within scope of employment
- Act by independent contractor
 - Appoint competent contractor
 - Supervise to confirm

WRONGFULNESS

Wrongfulness is described as the breach of the legal duty owed to the public to ensure safety, mitigate, reduce or control risks and hazards and warn of danger. Wrongfulness is firstly determined with reference to the general legal convictions of the community. Policies on road safety put the question of the communities' conviction that road transport safety is important beyond doubt.

An unlawful act is by its nature wrongful.

FAULT

The two main forms of fault are intention and negligence.

The latter is typically the form present in road maintenance-related claims. These terms refer to the legal concepts of blameworthiness.

The criterion established to determine if a person acted carelessly is relative to the objective standard of the reasonable person.

In a technical environment, the reasonable person is not the man in the street, but an appropriately experienced and competent technical person.

A person will act with negligence if he was in a position to foresee the reasonable possibility of his conduct injuring another in his person or property and causing him loss and not taking reasonable steps to guard against such occurrence.

FAULT 2

Negligence is the omission to do something which a reasonable man, guided upon those considerations which ordinarily regulate the conduct of human affairs, would do, or doing something, which a prudent and reasonable man would not do. The standard demanded is thus not of perfection but of reasonableness. It is an objective standard taking no account of the defendant's incompetence - he may do the best he can and still be found to be negligent." *Blyth vs Birmingham Waterworks* (1856) 11 Ex Ch 781,

FAULT 3: CONTRIBUTORY FAULT

Apportionment of Damages Act 34 of 1956: Section 1(1)(a):

Where any person suffers damage which is caused partly by his own fault and partly by the fault of any other person, a claim in respect of that damage

shall not be defeated by reason of the fault of the claimant but the damages recoverable in respect thereof shall be reduced by the court to such extent as the

court may deem just and equitable having regard to the degree in which the claimant

was at fault in relation to the damage.

CAUSATION

For a delict to be proven, the wrongful act must be the proximate cause of the damage or loss: there must be a plausible connection to the act. This connection must be determined from the facts of the case (factual causation) and if it is sufficiently close becomes the legal causation. The series of linked actions cannot be stretched to extreme ends: the wrongdoer is not liable for harm that is “too remote” from the conduct.

CAUSATION 2

Minister of Safety and Security v Van Duivenboden 2002 (6) SA 431 (SCA) at 449 E–F

A plaintiff is not required to establish the causal link with certainty, but only to establish that the wrongful conduct was probably a cause of the loss, which calls for a

sensible retrospective analysis of what probably have occurred, based upon the

evidence and what can be expected to occur in the ordinary course of human affairs

rather than an exercise in metaphysics.

DAMAGES

Neethling, *et al* (2001:212) defines damage as the diminution, as a result of a damage-causing event, in the utility or quality of a patrimonial (transmissible or relating to

money) or personal interest in satisfying the legally recognised needs of the person involved.

The losses consist of real rights (for example, property), loss of rights (for example, income or profit), direct and consequential loss, general (intrinsic, for example, pain and suffering) and specific (for example, medical expenses incurred up to trial) losses.

The loss of future right such as income, profit or expenses is the subject of prospective patrimonial damages.

Mitigation of loss places some obligation on the plaintiff to take all reasonable steps to limit

the damage caused by the defendant's delict. A plaintiff who fails to take reasonable steps

INCREASE IN CLAIMS: UK ROADS LIAISON GROUP 2005

- **Maintenance backlog on local roads and footways**
- **Media coverage of highway liability claims**
- **High-profile advertising.**
- **Media personalities**
- **Growth in no-win no-fee**
- **Open government – freedom of information**
- **Freedom of Information Act.**
- **New types of claims being made.**
- **Level of awards**
- **Fraudulent claims**

DEFINITIONS FOR ASSET MANAGEMENT

- **Asset:** A physical item of roadway infrastructure that has value. Assets are roadway “furniture” or “features”. An asset may be a single item, such as a sign, or a linear item, such as a road or guardrail section, or a spatial item, such as a rest area.
- **Category:** Logical groups of maintained assets that are combined because of their common function or location on the highway, such as pavements and drainage structures.
- **Feature:** Assets that are contained in a category. For instance, the traffic category might include guardrails, impact attenuators, and barriers.
- **Characteristic:** Specific performance measures that are rated for each feature.

STANDARD (ISO DEFINITION):

A **standard** is a document that provides requirements, specifications, guidelines or characteristics that can be used consistently to ensure that materials, products, processes and services are fit for their purpose (ISO, n.d.)

The road maintenance characteristics proposed for the development of standards in this thesis meet certain criteria. They are:

- Measurable quantitatively or qualitatively;
- important for maintenance management systems in general; and
- contribute to the safety objectives and safety management in particular.

Table 5- 1: Road maintenance standards characteristics

Category	Feature	Characteristics
Roadway	Lane and surfaced shoulder	Texture Skid resistance Rutting and ponding Potholes and shoving Loose material
	Gravel shoulder	Edge drop-off Edge break
Traffic Control	Road markings	Visibility
	Road signs	Visibility and readability
Drainage	Side drains	Blockages Grid inlet cover
	Cross drainage	Culvert openings Flow channel
	Roadway	Flow path
Road side	Clear zone/Recovery area	Designed width Slope
	Barrier	Guardrail Guardrail terminals Bridge ballustrade
	Vegetation	Highway trees Lines of sight

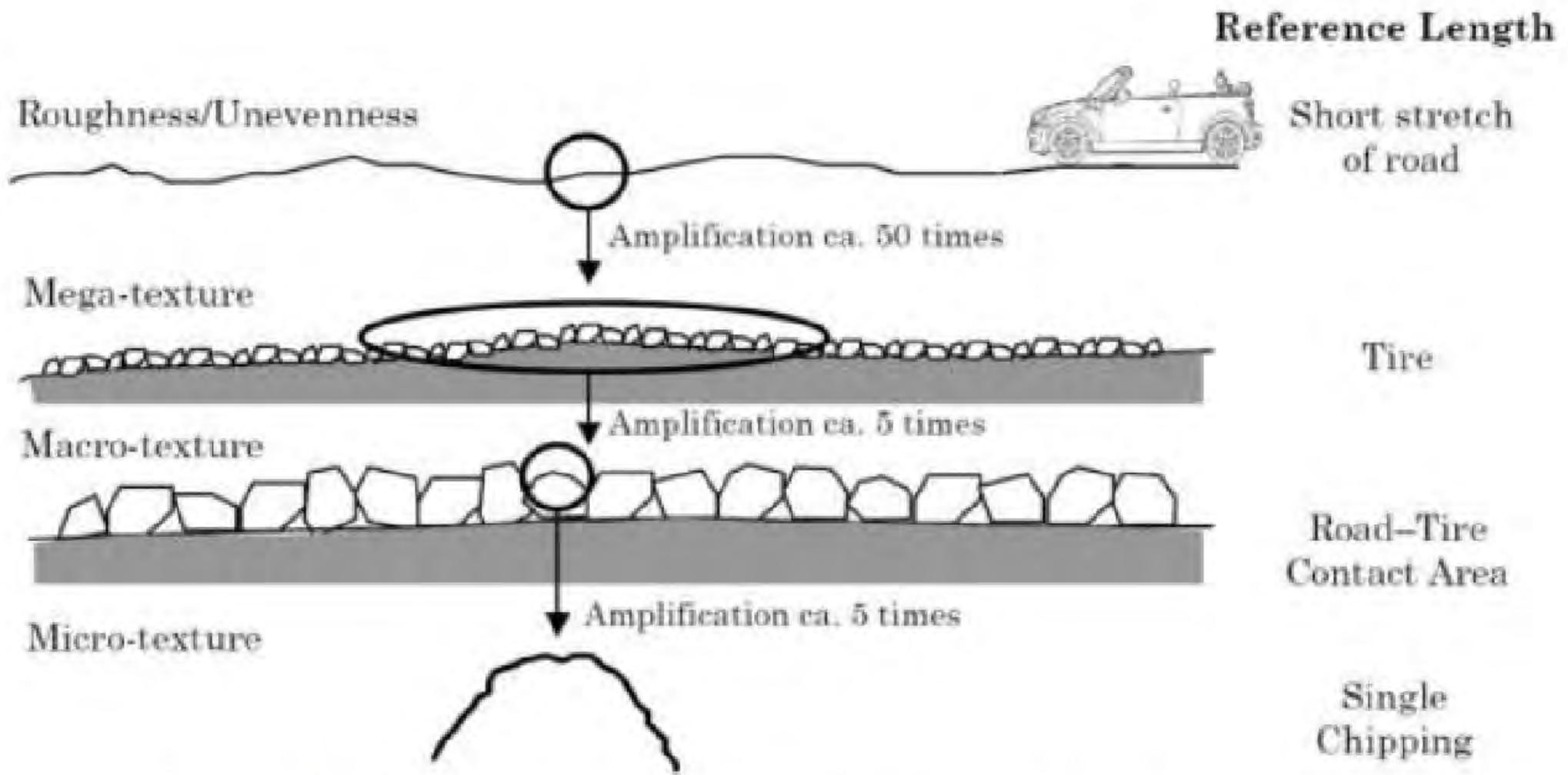


Figure 5- 1: Simplified illustration of texture ranges after Sandberg (1998)

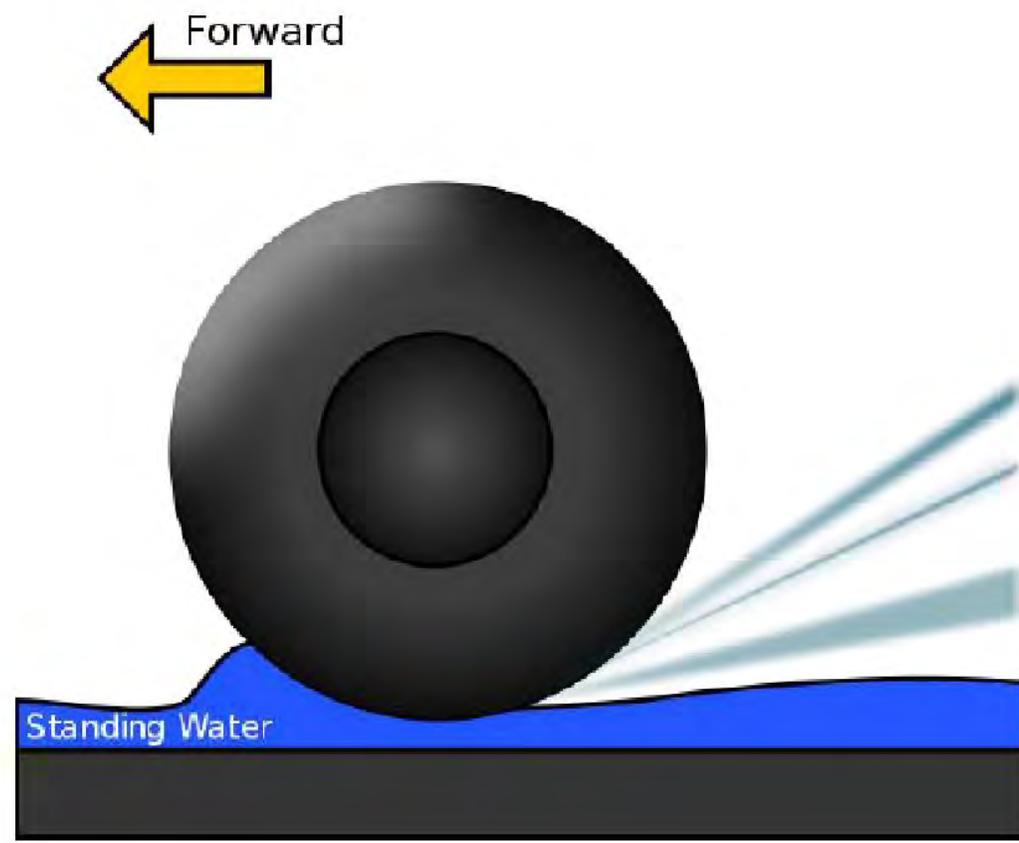


Figure 5- 2: Illustration of hydroplaning

Source: (Victovoi, n.d.)

Table 5- 4: Service brake minimum deceleration rate

Requirements for braking performance – Table A

Service brake of motor vehicle or combination of motor vehicles
capable of exceeding speed of 40 km/h

[Table heading substituted by GNR.404 of 2007]

	Initial speed in km/h	Maximum stopping distance in m	Minimum deceleration in m/s²	Minimum equivalent braking force in N/kg
Light motor vehicle	35	14	4.4	4.4
Heavy motor vehicle	35	16	4.4	4.4

Source: NRTA 1996

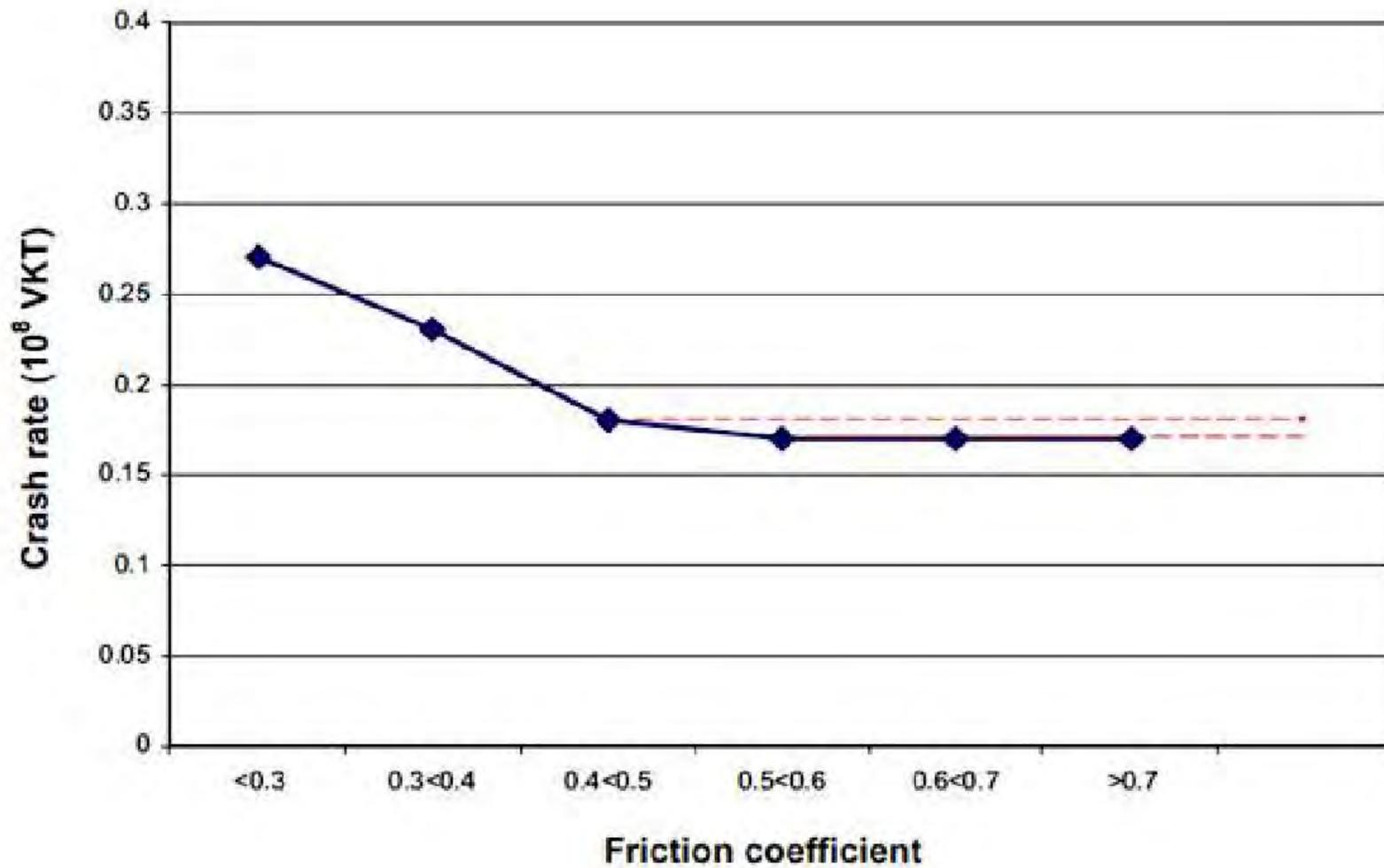


Figure 5- 3: Relationship between friction and crash rate

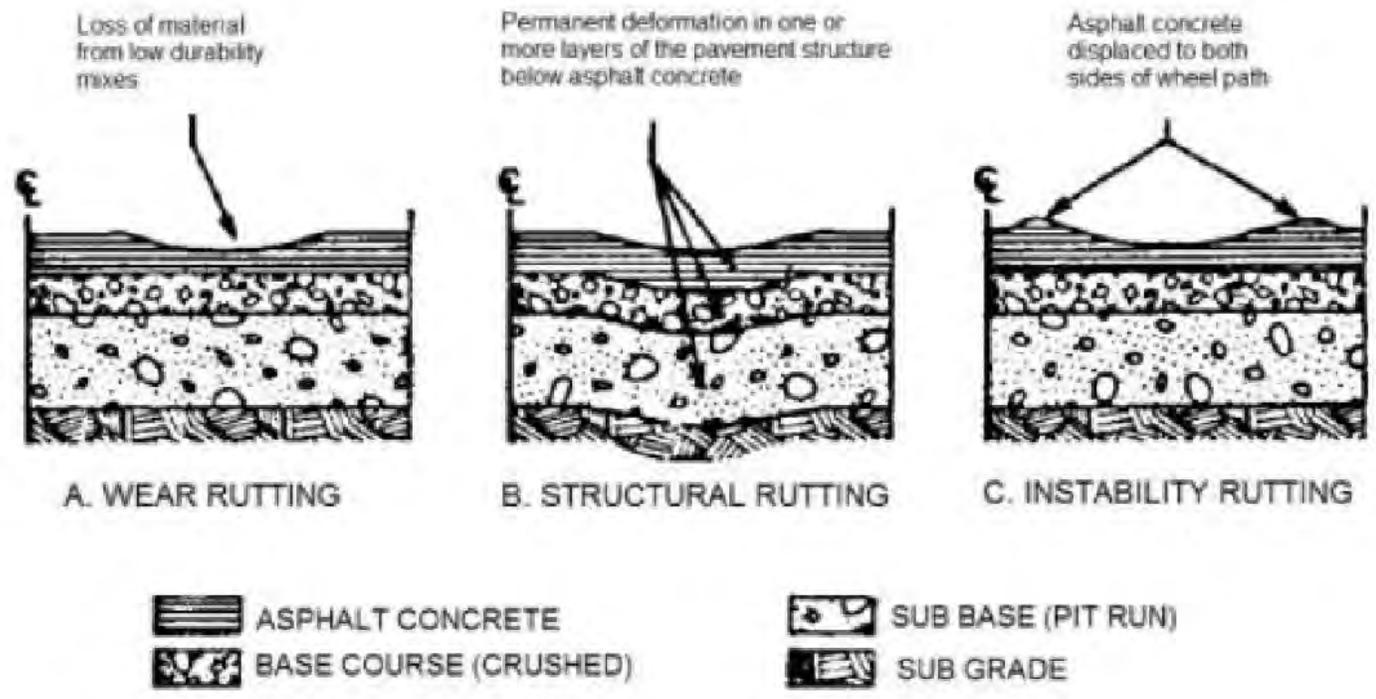


Figure 5- 5: Illustration of rutting modes

Source: (White, et al, 2002)

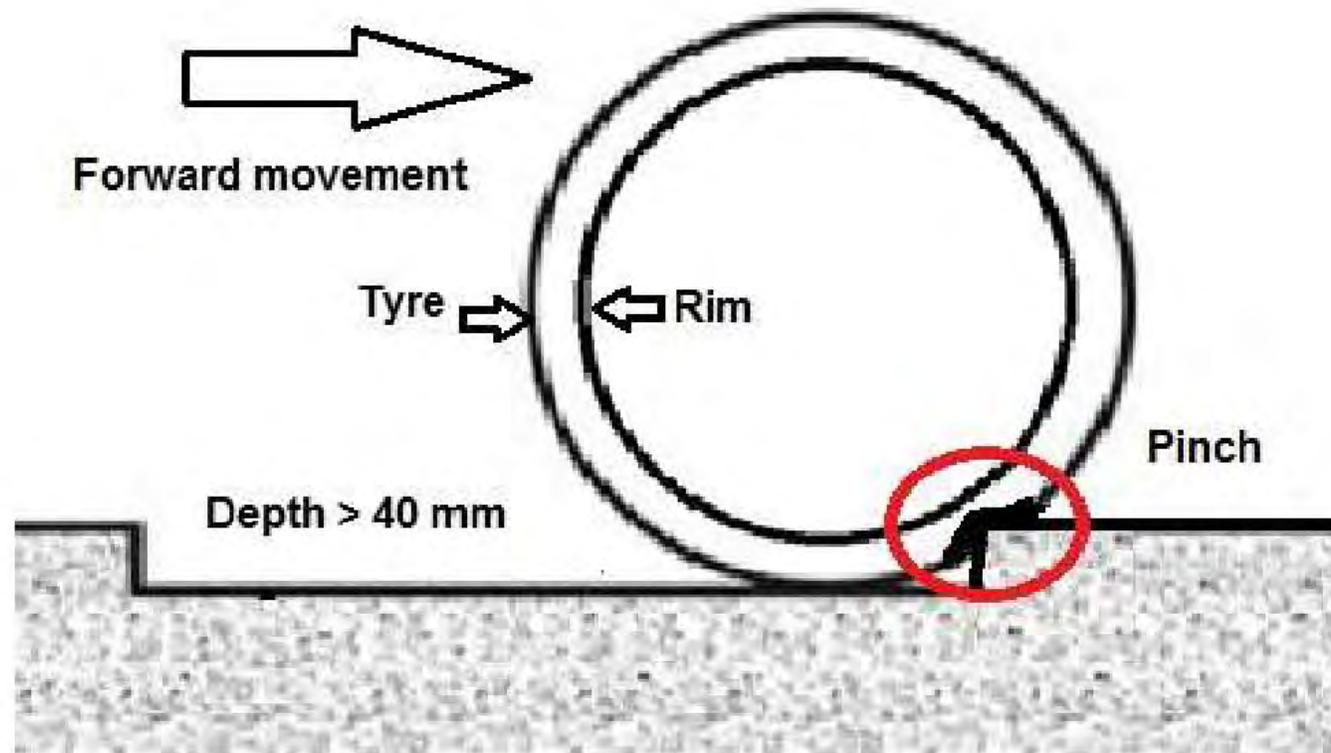


Figure 5- 6: Critical pothole for low profile tyre

Adapted from (Zimmer & Ivey, 1983)

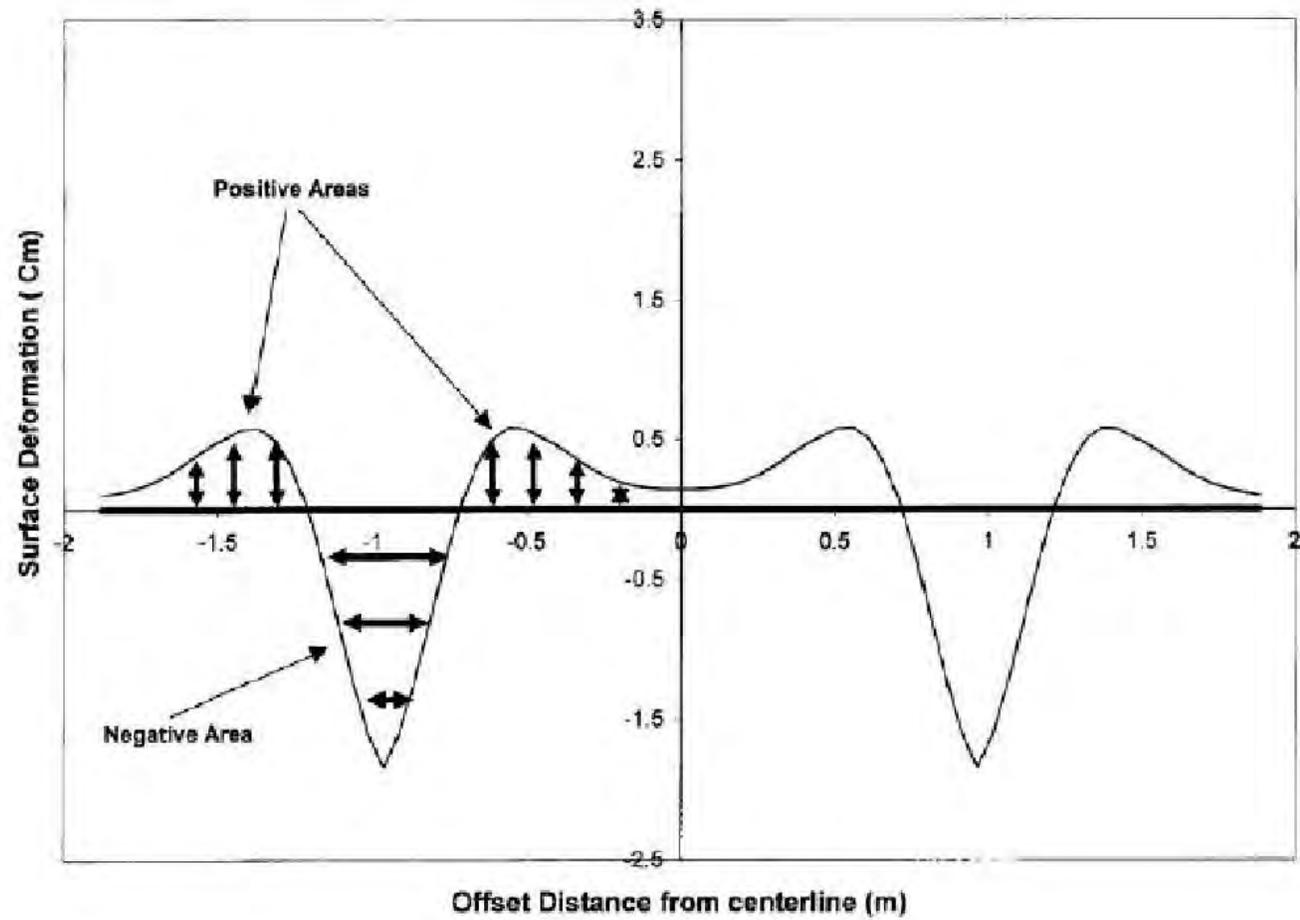


Figure 5- 7: Surface deformation illustrating shoving

Source: Figure 2 in White, *et al*, 2002

The background is a dark blue gradient. In the corners, there are decorative white and light blue lines that resemble a circuit board or a network diagram. These lines consist of straight segments connected by small circles, forming a complex, interconnected pattern.

LOOSE MATERIAL

EDGE DROP-OFF

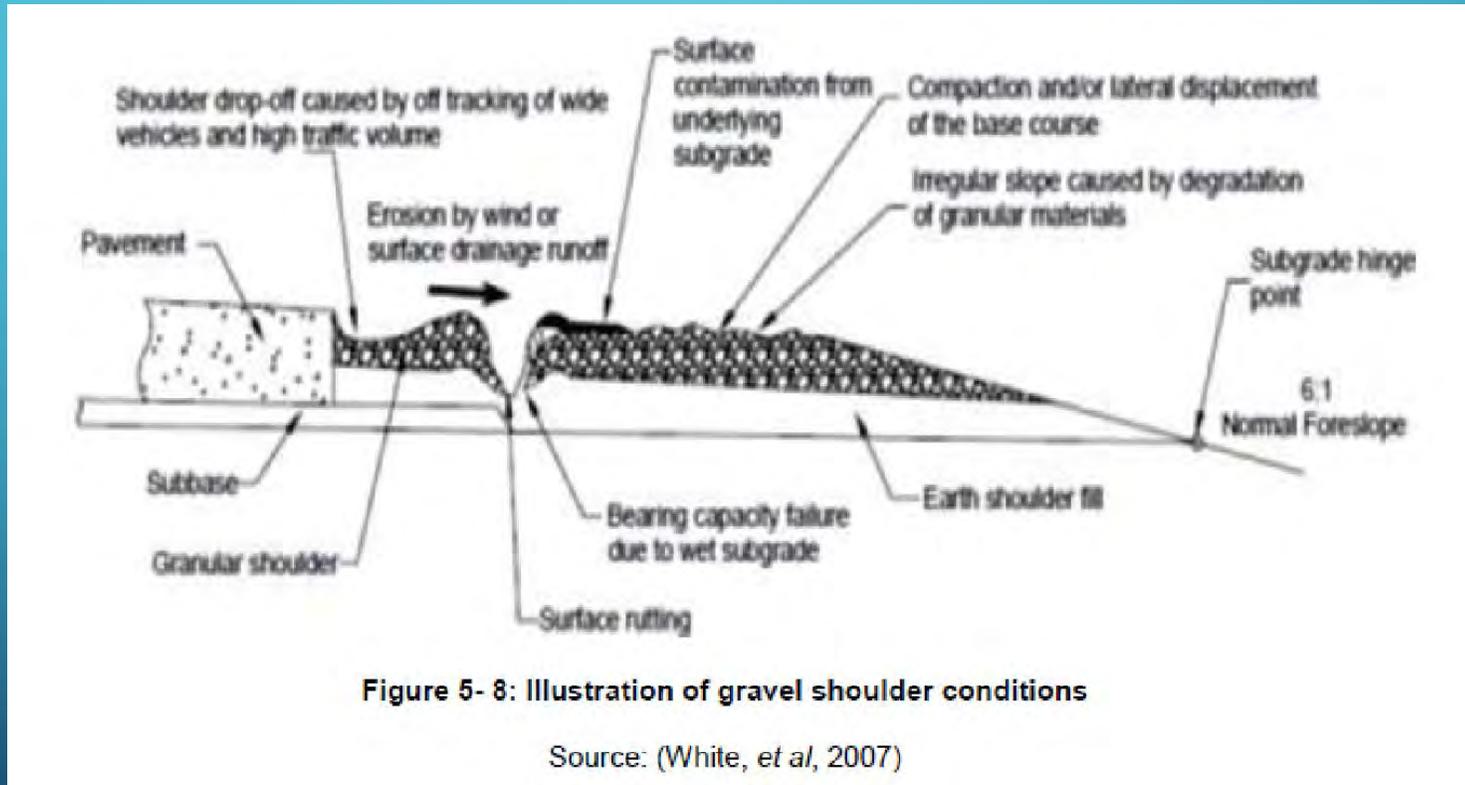


Figure 5- 8: Illustration of gravel shoulder conditions

Source: (White, et al, 2007)

SHOULDERS

- Shoulders provide space for emergency storage of disabled vehicles;
- shoulders provide space for enforcement activities;
- shoulders provide space for maintenance activities;
- shoulders provide an area for drivers to manoeuvre to avoid crashes;
- shoulders improve bicycle accommodation;
- shoulders increase safety by providing a stable, clear recovery area;
- shoulders improve stopping sight distance at horizontal curves;
- on highways with curb and enclosed drainage systems, shoulders store and carry water during storms, preventing water from spreading onto the travel lanes;
- shoulders improve capacity by increasing driver comfort; and

ROAD MARKING

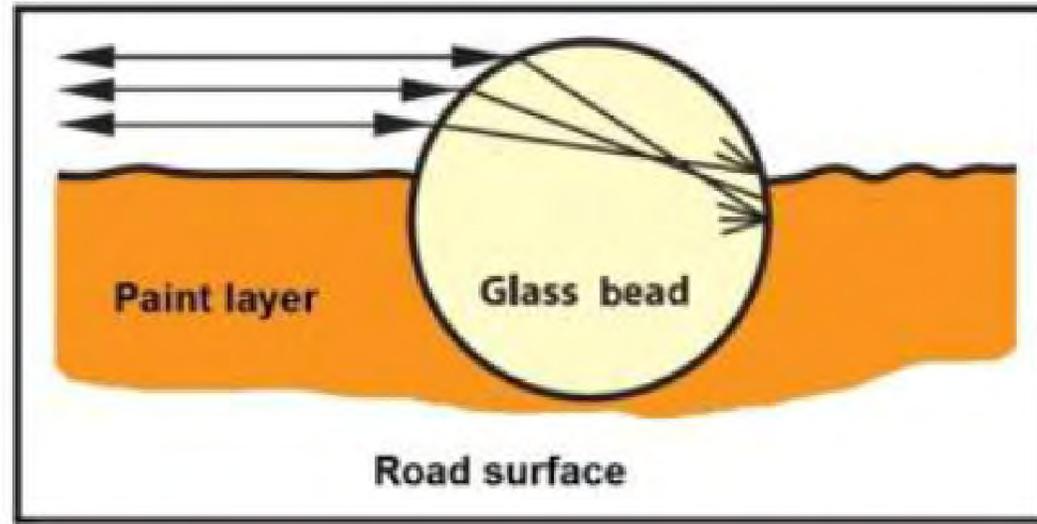


Figure 5- 9: Retroreflectivity provided by glass beads in road paint

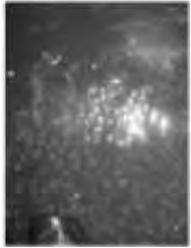
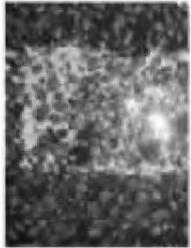
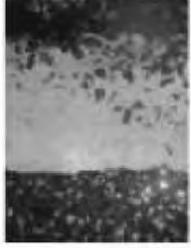
Score	Example	Score	Example
0		3	
1		4	
2		5	

Figure 5- 11: Images for visual assessment of road markings

Source: (The Highways Agency, 2007)

ROAD SIGNS

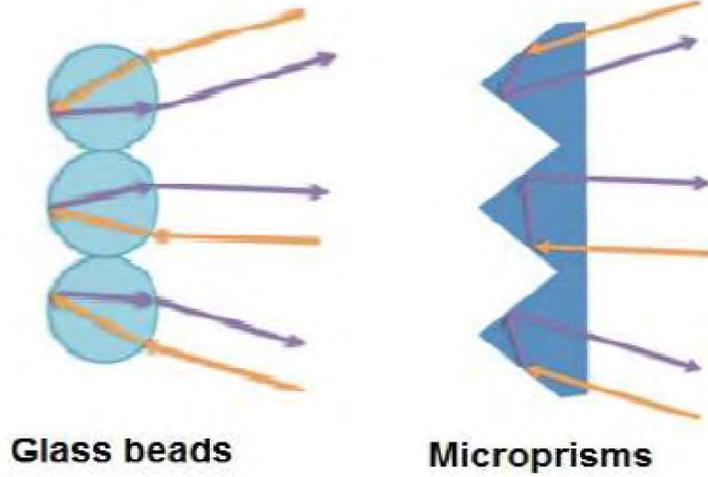


Figure 5-12: Retroreflection by glass beads and microprisms

DRAINAGE

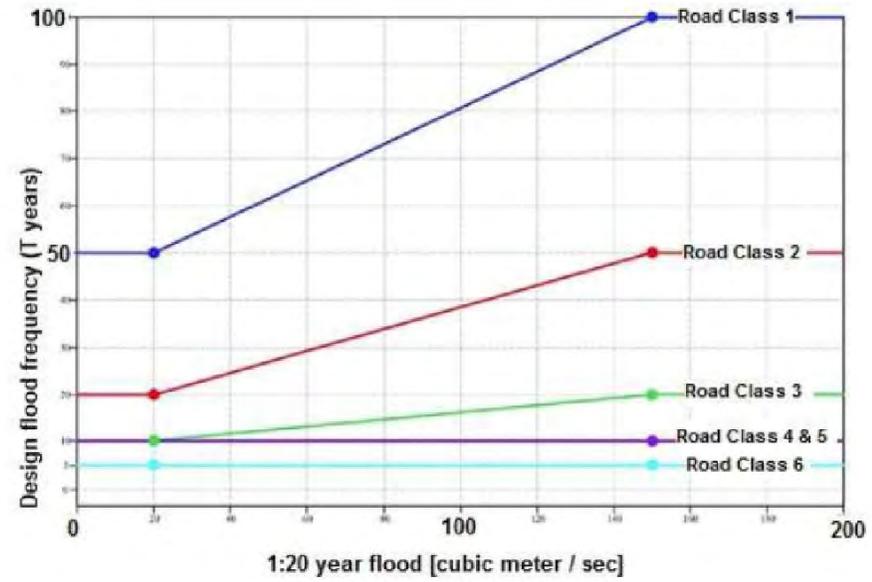


Figure 5- 13: Design flood frequency estimate

Source: (SANRAL, 2013a)

Table 8- 1: Standards for maintenance for safety of road infrastructure

Category	Feature	Characteristics	Standard	Inspection frequency	Maintenance type	Response time: fix within
Roadway	Lane and surfaced shoulder	Texture on roads with operating speed > 80 km/h	0.5 mm estimated texture depth	Two years	Planned	6 months
		Skid resistance on road with operating speed < 80 km/h	0.45	Two years	Planned	6 months
		Rutting and ponding	20 mm depth	Two years	Planned	6 months
		Potholes and shoving	200 mm x 300 mm x 50 mm depth	12 months	Reactive	One week
				One month if distressed		One week
	Daily if not fixed			One day for temporary fix		
	Loose material	No loose material	One week	Reactive	2 days	
	Gravel shoulder	Edge drop-off	50 mm	12 months	Routine	6 months
Edge break		100 mm	12 months	Routine	6 months	

Table 8- 1: Standards for maintenance for safety of road infrastructure

Category	Feature	Characteristics	Standard	Inspection frequency	Maintenance type	Response time: fix within
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Traffic control	Road markings	Visibility	70% residual paint on 75% of area	12 months	Planned	12 months
	Road signs	Visibility and readability	75% of new values per class of reflective material	12 months	Planned	12 months
		Missing signs (regulatory, warning and guidance)	No missing signs	One week for Classes 1 and 2	Reactive	One day
				Planned	One week	
	12 months for other classes complaints	Reactive	One day			

Table 8- 1: Standards for maintenance for safety of road infrastructure

Category	Feature	Characteristics	Standard	Inspection frequency	Maintenance type	Response time: fix within
Drainage	Side drains	Blockages	No blockages	Six months Aligned with rainy season	Planned	Six months
				Complaints	Reactive	One week
		Grid inlet cover	100% in place	One week	Reactive	One day
	Cross drainage	Culvert openings	100% open: no siltation	6 months Aligned with rainy season	Planned	Six months
		Flow channel	No shrubs or trees	12 months	Planned	Six months
	Roadway drainage	Flow path texture	0.5 mm	12 months	Planned	12 months
		Edge drainage	No blockage of down chutes	One month in rainy season	Routine	One week

Category	Feature	Characteristics	Standard	Inspection frequency	Maintenance type	Response time: fix within
Roadside	Clear zone/ Recovery area	Designed width	No unauthorised objects, signs or trees in designed width	12 months	Routine	One month
	Barrier	Guardrail and terminals	No damage	One week	Reactive	One day
		Bridge balustrade	No damage	12 months	Routine	Six months
	Vegetation	Highway trees	Height less than distance from road Tree health certified	12 months	Planned	12 months
		Lines of sight	Stopping sight distance Shrubs and grass height < 1 m	One month	Routine	One week

Table 9- 1: Reasons for road authorities' failure to execute maintenance duties

Cause	Example statements
<p>Maintenance code of practice</p> <p>The lack of a maintenance code of practice for road authorities with explicit and adequate engineering standards and minimum specifications and threshold levels for intervention to prevent deterioration of safety conditions for maintenance of roads, available in a structured framework for proper reference.</p>	<p>Comprehensive standards for maintenance of road infrastructure for safety have not been developed. This is due to <i>inter alia</i> the concern of road authorities for not being able to uphold such standards, of more claims for damages and lack of knowledge of legal duty.</p> <p>Failures of road safety occur because road authorities' intuitive norms and rules of thumb are not always codified and adhered to in a consistent and measurable way.</p> <p>Norms and standards are presently scattered in guidelines, manual and directives.</p> <p>Published norms and standards must be collated and interpreted, and confirmed to expand the body of knowledge into a comprehensive suite of practice guidelines.</p>

Loss of key technical staff: Key staff are often not replaced or they are replaced by less qualified staff. The South African Institute of Civil Engineering revealed that 79 of the 231 local municipalities had no civil engineers, technologists or technicians on their permanent staff (SAICE, 2011).

A comprehensive municipal skills survey was undertaken by SAICE in 2007. Of all 283 municipalities surveyed, 83 had no civil engineers, technologists or technicians on staff. A further 48 employed only one civil technician, and municipalities with civil engineering staff reported 35% vacancies (over 1000 professionals), often owing to budget constraints.

It is clear that much of local government is indeed in distress, and that this state of affairs has become deeply rooted within our system of governance. A recurring theme is the inadequate capacity of service providers to fulfil their responsibilities. Delivering and operating new infrastructure are complex activities but competent skilled persons are in short supply, especially in rural areas.

The lack of competent and experienced practitioners, especially within management levels, results in standards not being applied.

The standard operating procedures are based on the collective wisdom and technical knowledge of the industry.

The road safety crisis in South Africa is partially due to the severe shortage of competent road engineers and the risk of unskilled persons occupying technical posts in road authorities.

A 2006 survey observed that many municipalities lacked the capacity simply to answer the survey questionnaire, implying that they would be similarly incapable regarding roads maintenance and management (SAICE, 2006)

<p>Negligence</p> <p>Negligence in road maintenance:</p> <p>Routine safety inspections are neglected, problems identified are not rectified, poor workmanship, lack of quality assurance on road maintenance</p> <p>Keeping to reaction times as dictated by urgency (the extent of hazard to safety) and importance of the road. (Response times to react to hazardous conditions)</p> <p>Excessive reactive maintenance increases risk</p>	<p>Roads maintenance and management (SANRAL, 2009)</p> <p>Failures of road safety occur because road authorities often neglect supervision of maintenance due to incompetence or complacency.</p> <p>There are rarely consequences for failure of road maintenance, even though "maintenance of existing assets is obligatory".</p> <p>Potholed roads have become the rule, especially in the northern provinces.</p> <p>"The Team is required to inspect the site frequently so that problems are identified, the causes investigated and assessed and the actions required identified and carried out timeously. Obvious problems should be noted as soon as they become evident and serious situations should be reacted to and reported immediately (SANRAL 2009:2-2)."</p>
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Lack of funding for road maintenance.

Poor planning, execution and control of the budget for road maintenance.

Inappropriate prioritisation in allocating budgets: Prioritisation of new infrastructure happens at the expense of maintaining existing assets.

Maintenance budgets: These are often treated as discretionary budget line items and are the first to be cut to realise savings.

choice but to do it (CHISEL, 2017).

Failures of road safety are exacerbated by inadequate funding through the politicised process of budgeting within government.

Prioritise: Current funding available for roads and storm water infrastructure is insufficient for meeting existing maintenance and rehabilitation requirements in the sector. There is therefore a need for reprioritisation on municipal budgets to effectively deal with its core services and manage competing needs.

To utilise the limited budget in a reasonable and logical manner, it is accepted practice that high-volume, strategic and economically important roads are prioritised over lesser roads.

The allocation of maintenance funding is, with very few exceptions, simply not sufficient, especially in circumstances where it is expected to also cater for a maintenance regime that has led to neglect.

<p>Lack of integrated asset management</p> <p>Lack of planning, implementation and control of Treasury guidelines on roads-related asset management, including regular audits.</p> <p>The lack of understanding that all aspects of road maintenance must be implemented in an integrated way to meet acceptable standards to provide a safe road infrastructure.</p> <p>There is a lack of implementation of road maintenance systems and asset management systems.</p>	<p>Maintenance regime that has led to neglect.</p> <p>Infrastructure asset management in the public domain is mandated by treasury guidelines and general requirements for accounting practices, in particular GRAP 17: Property, Plant and Equipment</p> <p>A full inventory and condition register of all public capital works such as buildings and roads must underpin maintenance programmes.</p> <p>The requirements of public asset and risk management have become part of government obligations and are subject to auditing.</p> <p>Lack of asset lifecycle planning capability: Maintenance of roads and storm water infrastructure is mainly done on an <u>ad hoc</u> basis as there is no proper base for planning and budgeting for planned maintenance of infrastructure.</p> <p>The importance of life-cycle costing has already been mentioned, but cannot be overemphasised.</p> <p>A 2007 DoT survey observed that of the municipalities that did reply, only 36% indicated some form of a road management system (SAICE, 2011)</p>
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	management system (SAICE, 2011)
<p>Road authority legal duty not prescribed</p> <p>The South African legal system has defined the legal duty of the road authority but road authorities do not motivate for resources on this basis or take the judgments as prescriptive.</p> <p>The political will to reduce road fatalities and accidents is not matched by resources.</p> <p>Policy and legislation promoting road safety with regard to road maintenance aspects.</p>	<p>South African courts treat each case on its merit, preferring to neither prescribe the legal duty nor the standards of care in provision or maintenance.</p>

