



Roads Maintenance Forum

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Road Maintenance Management Systems – recent successes

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Introduction

Road infrastructure and transportation networks are fundamental arteries. Their strategic importance extends beyond mere connectivity, acting as crucial enablers of economic growth, social development, and overall societal well-being.

- **Enhancing productivity:** Efficient transportation infrastructure improves accessibility to jobs, education, healthcare, and other essential services. **Reduced travel times and improved logistics also boost overall productivity across various sectors.**
- **The cost of doing business:** Reliable and high-quality road infrastructure is a significant factor in attracting both domestic and foreign direct investment. Businesses are more likely to invest in regions with efficient transportation networks that facilitate the movement of raw materials, finished goods, and personnel.
- **Well-maintained road network:** Generate direct, indirect and social benefits long after the construction part has been completed.

Example of Mozambique

Following the end of the civil war, Mozambique experienced a period of strong economic recovery and high growth rates, averaging around **10 – 12% annually between 1995 and 2000**. This was among the fastest-growing economies in the world during that period.

This growth was supported by post-conflict peace, internal reforms, but most importantly, **road reconstruction that connected rural communities to markets**.



Road deterioration simulation





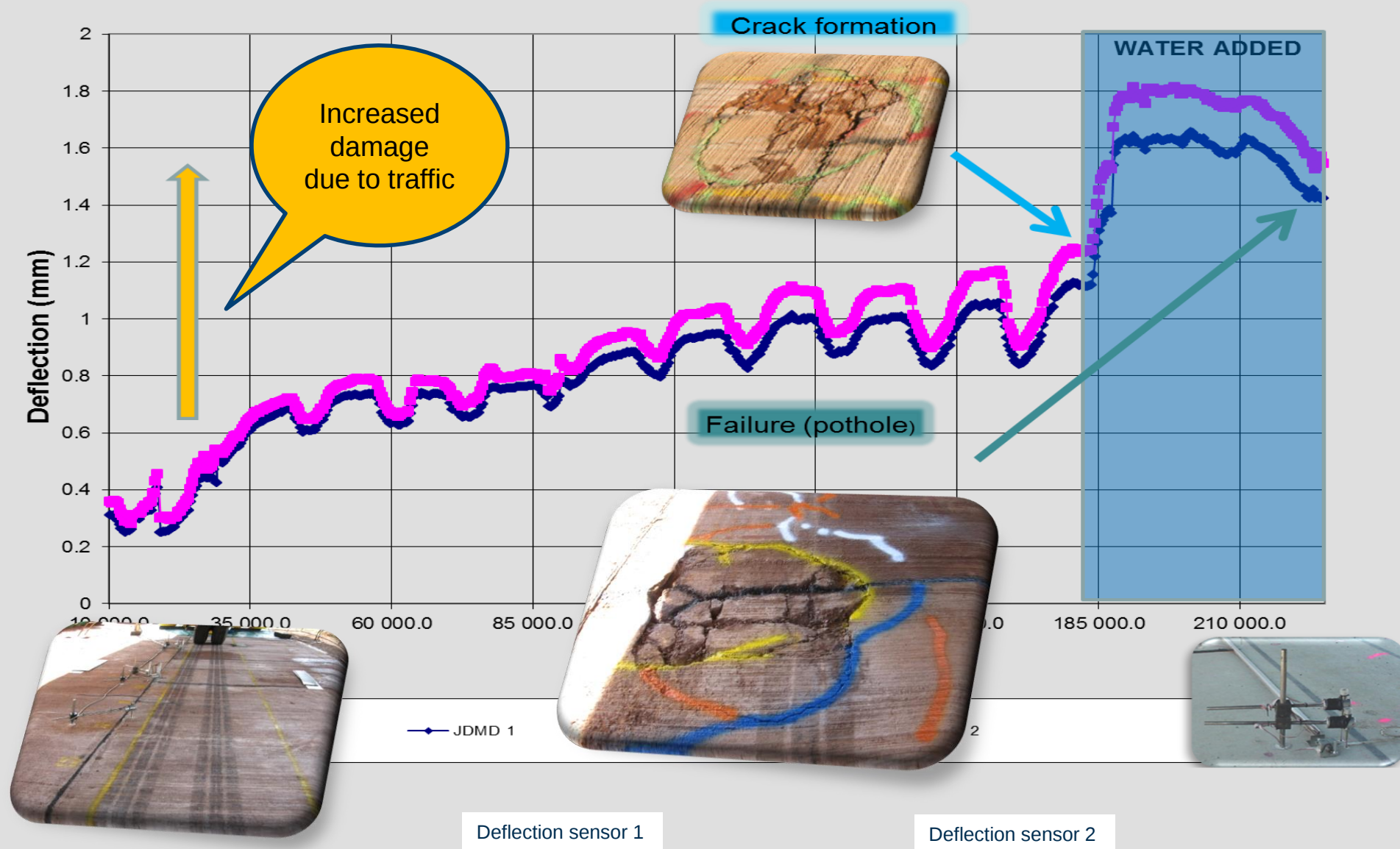
Example of road damage simulation using the GDRT Heavy Vehicle Simulator (HVS):

Main purpose: to improve road design maintenance and construction practices

Evaluates the performance of roads under accelerated traffic; simulates damage caused by traffic over 20 years, in +/- 3 months



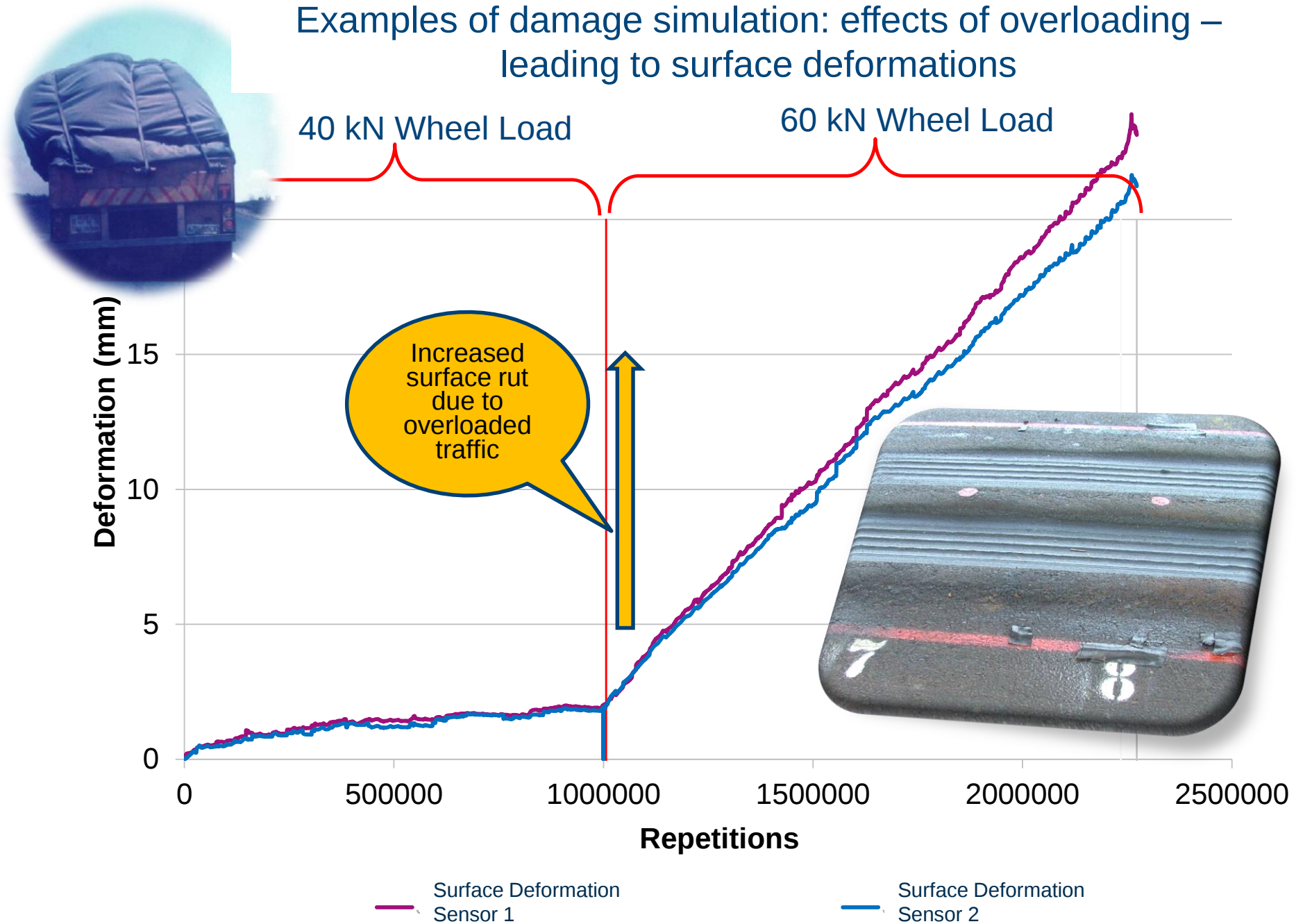
Examples of road damage simulation: effects of water penetrating a cracked (concrete) pavement - leading to potholes



Failure after 610 000 repetitions



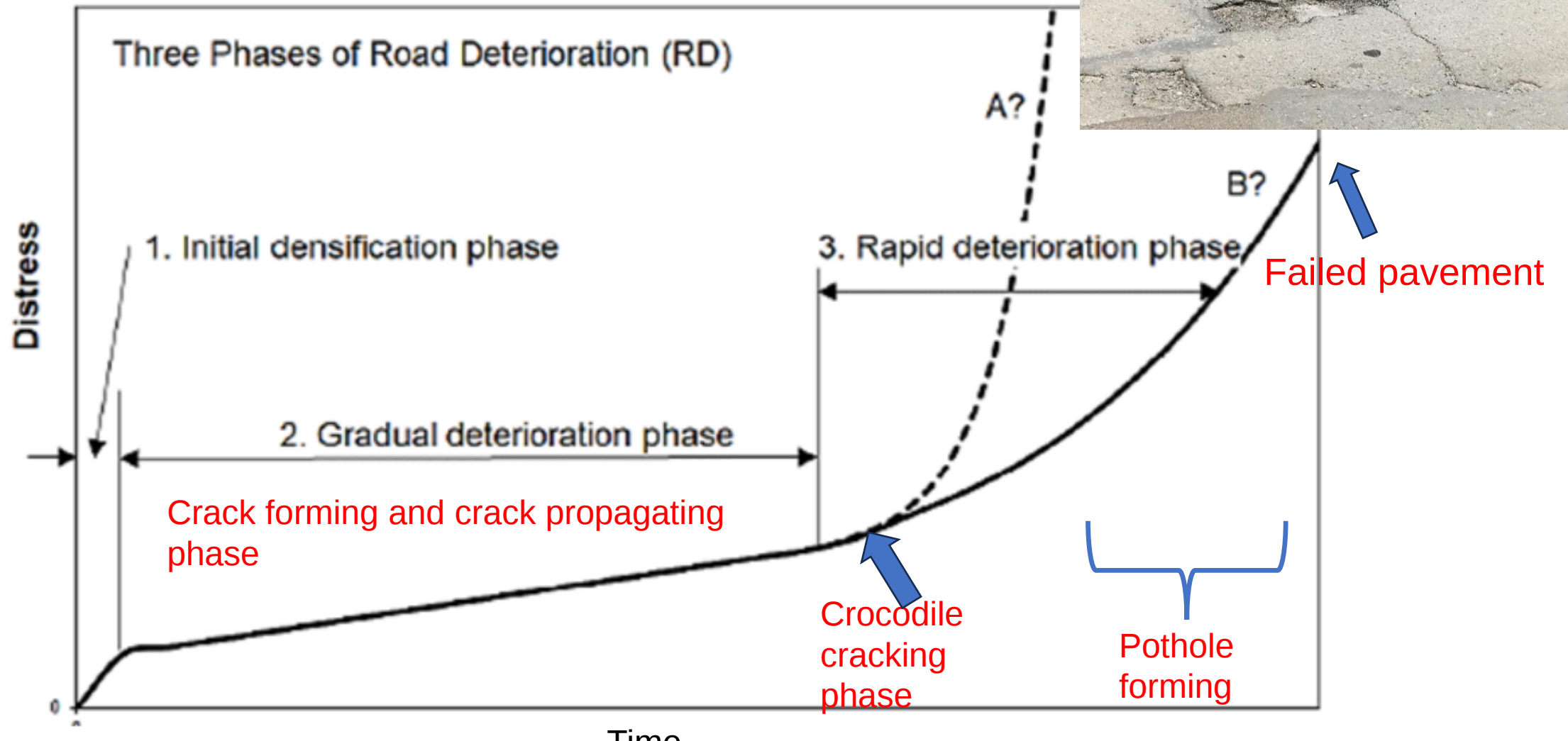
Examples of damage simulation: effects of overloading – leading to surface deformations



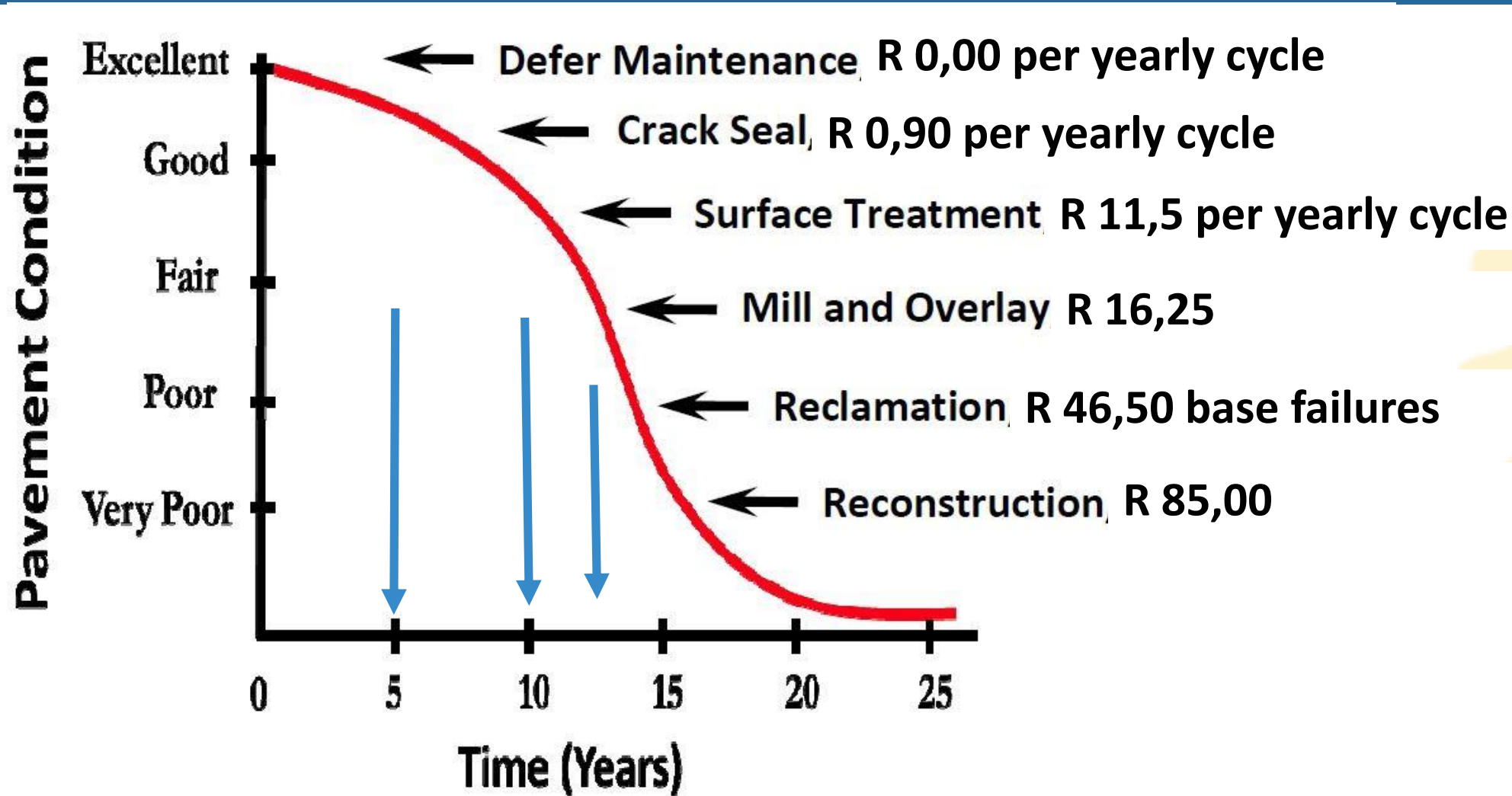
Road deterioration without maintenance

- I believe that preventive road maintenance is the best strategy for authorities to manage road deterioration.
- By identifying the following three phases of road deterioration and implementing appropriate maintenance measures, you can extend the life of roads, save money on costly repairs, and prevent accidents and vehicle damages caused by road defects.
- Therefore, it is crucial to prioritise preventive maintenance as an essential part of a long-term road management strategy.
- By doing so, you can ensure that roads remain a reliable and safe means of transportation for generations to come.

Three phases of road deterioration



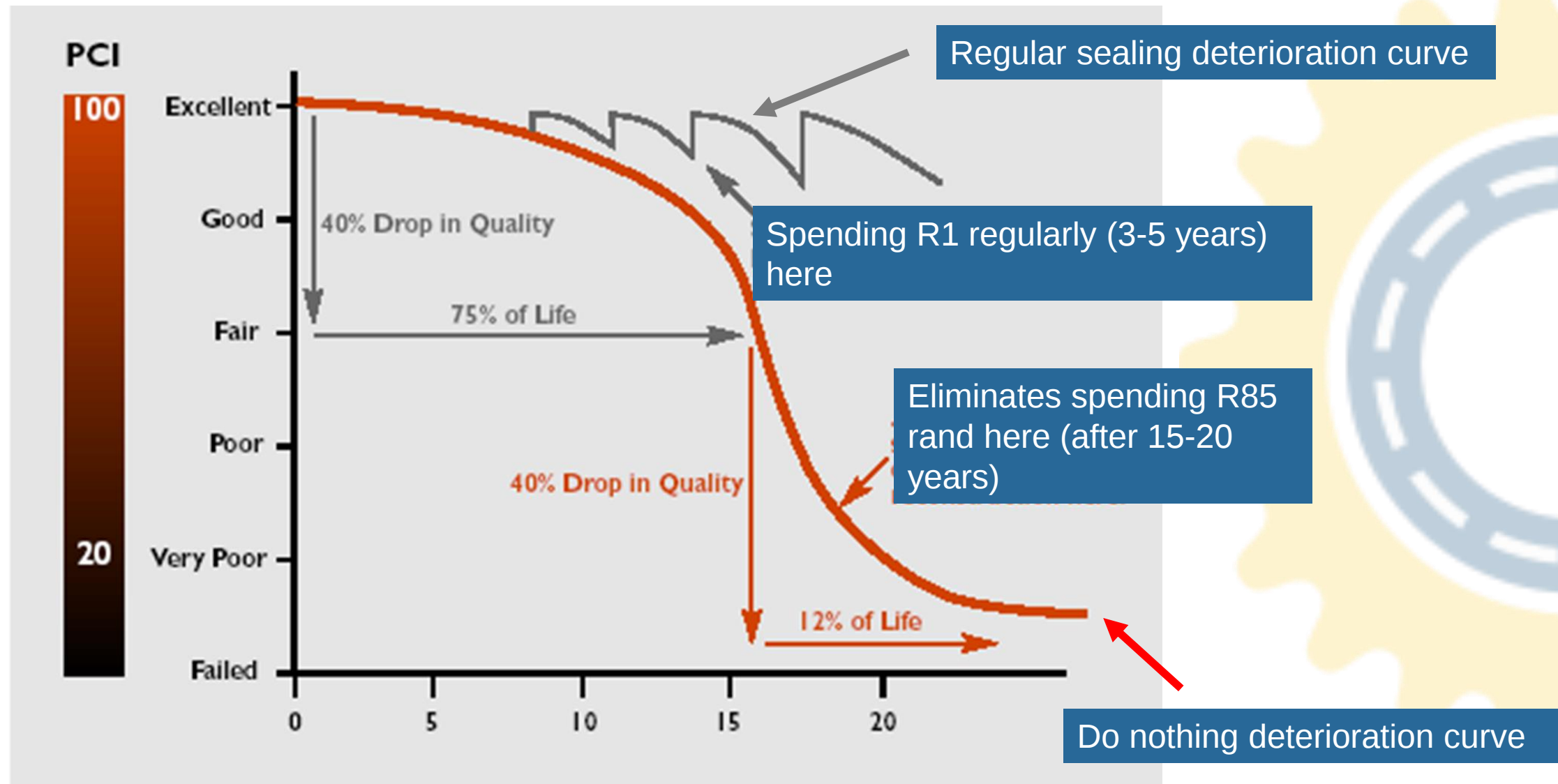
Maintenance now or bankrupt tomorrow - the price of doing nothing



If you delay crack sealing at y 3-5 (costing 0,9 units per year)

Relates to the reconstruction costs of 85 times the cost of crack sealing

The Solution: Early crack detection and regular sealing



Practical examples



Deterioration without maintenance: In-field example 1



Deterioration without maintenance: In-field example 1



Deterioration without maintenance: In-field example 1



Deterioration without maintenance: In-field example 2



Gravel road deterioration without maintenance: In-field example 3



Pothole patching: patching yourself into a bigger hole



- The habit of pothole patching is vital and necessary to prevent accidents, damage to vehicles and expensive court cases.
- But the reality is that as soon as one hole is fixed, the next one will follow suit.
- This iterative process is never-ending, as the pavement has reached the end of its service life.
- The only option now is to close the road, and reconstruct it at a cost of between R30 to R50 million per km!
- Early crack detection and sealing would have prevented all this.

GDRT Response to Road Maintenance

- The GDRT developed a Road Asset Management System (RAMS) as prescribed by NDoT.
- It is a robust system to ensure that the yearly Provincial Road Maintenance Grant (PRMG) offered to provinces are wisely spend.
- It measures functional (mainly visual assessments) and structural integrity of provincial roads.
- Visual assessments are done annually while structural assessments (profile measurements and surface deflection FWD testing) are done every 2 to 3 years.
- NDoT monitors the overall condition changes of provincial roads in light of PRMG spending.

GAUTENG PROVINCIAL GOVERNMENT

DEPARTMENT OF ROADS AND
TRANSPORT

**ROAD ASSET
MANAGEMENT PLAN
(RAMP)
2024/25**



THE LIFE CENTRE BUILDING
45 COMMISSIONER STREET
JOHANNESBURG

To qualify for the grant, provinces must submit a RAMP that contains the following information:

- Network hierarchy and inventory;
- Performance management framework;
- Gap analysis;
- Information and systems, and lifecycle planning;
- Current and future traffic demand (up-to-date traffic counts);
- Network visual condition;
- Structural assessments (rutting roughness, deflections);
- Financial plan; and
- Monitoring, reviewing and continual improvements.

Example GDRT 2024 VCI data

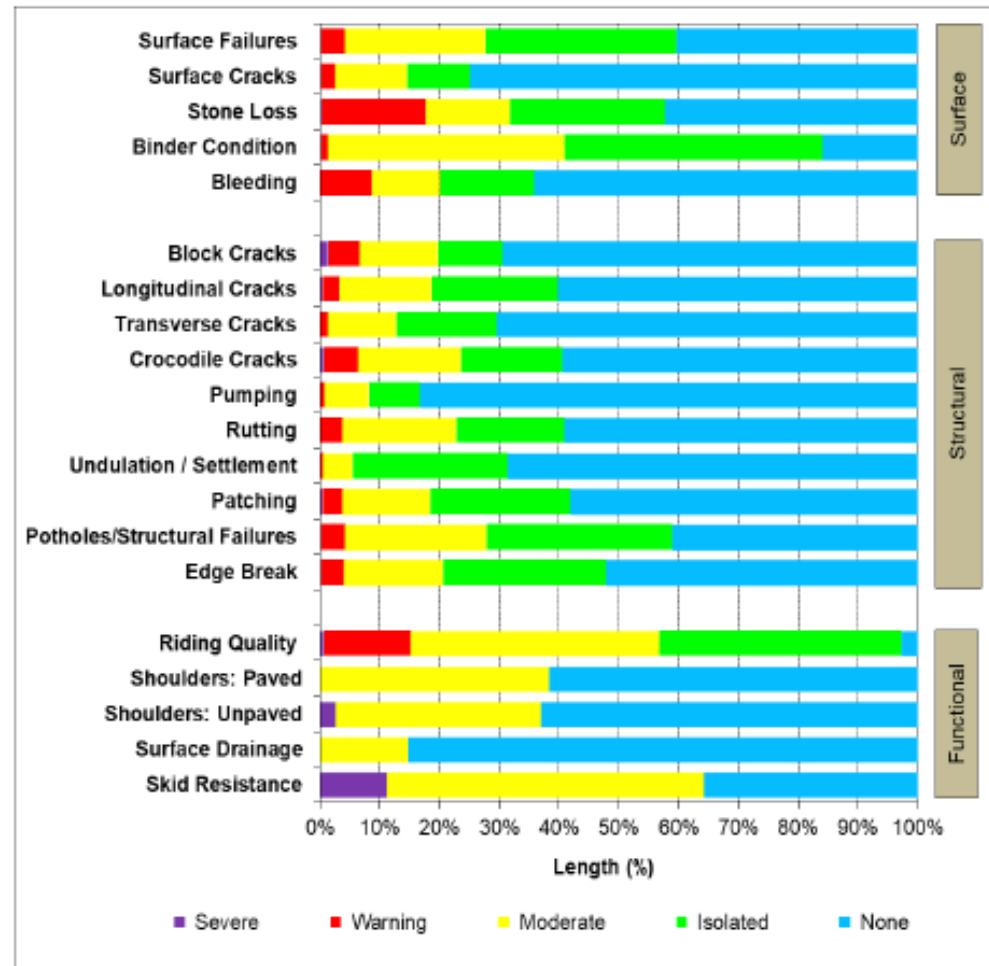


Figure 4-18: Distress Distribution Graph for Visual Assessments of Surfaced Roads

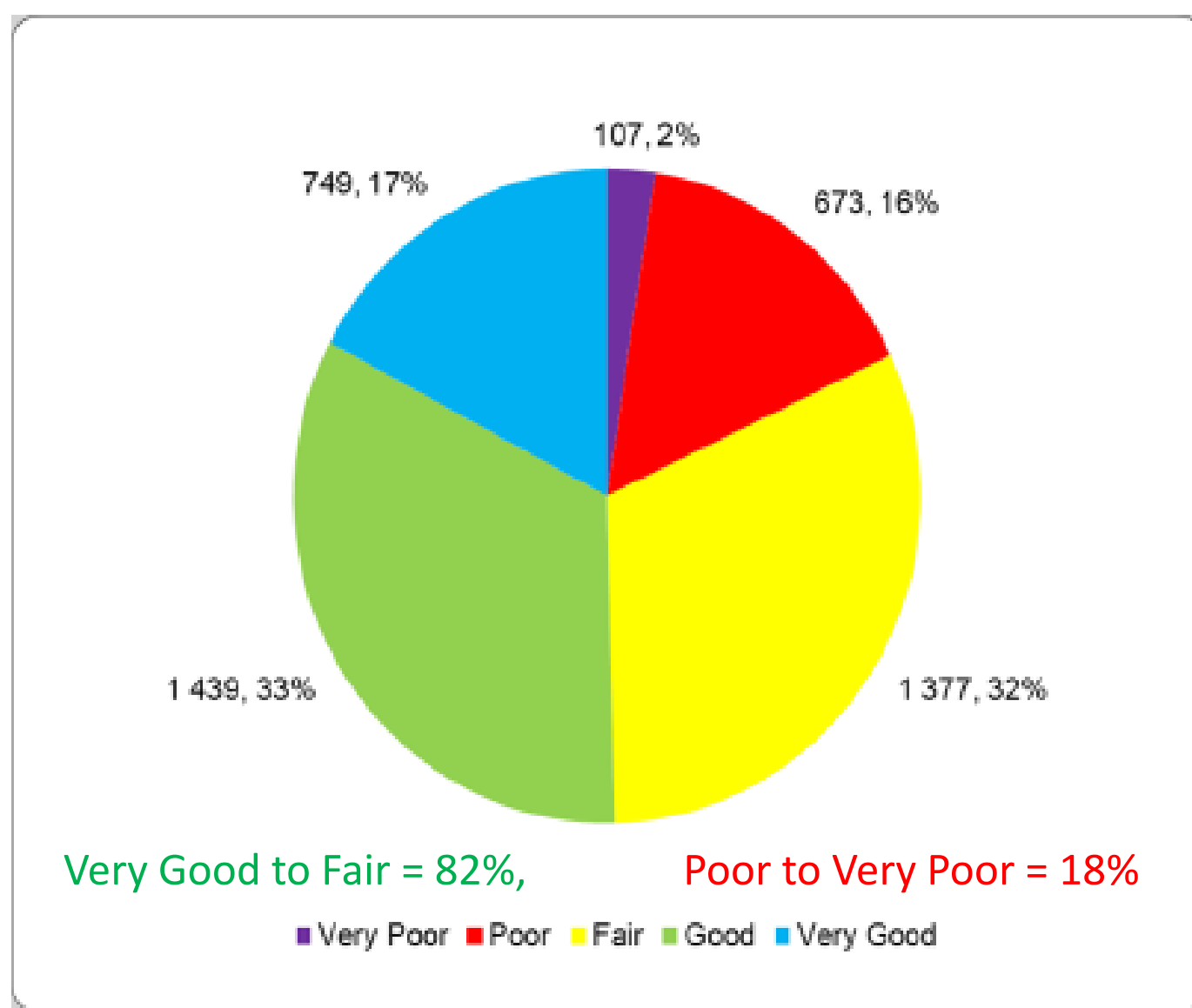


Figure 4-6: : Length (km, %) of Surfaced Roads per VCI Category

GDRT indicative budget allocation

In line with the importance of early distress detection and preventative maintenance strategies, the GDRT allocates the bulk of the Roads Branch overall budget to maintenance activities:

- **Maintenance Directorate: R2.1 billion**
 - This budget consists of all funding streams: The Provincial Road Maintenance Grant, the Provincial Equitable Share and the EPWP (Expanded Public Works Programme) Grant.
- **Construction Directorate: R1.5 billion** (Capital expenditure)
- **Design Services Directorate: R140 million**
 - R80 million for designs and R60 million for land acquisition to secure the road reserves for the implementation of future roads.



Strategies to maintain and prolong pavement life: Gravel road stabilisation

- Gravel road distress is largely due to gravel loss estimated at 20,7 million tonnes on the SA gravel network.
- Water consumption: Approximately 4,6 million m³ of water yearly used for resurfacing compaction (excluding dust control)
- 150 mm re-gravelling can cost over R1.1 m per km for a 7 m wide surface.
- Draft TRH 24 prescribes the use of polymers and nano-silanes with water-repellent characteristics, (waterproofing) protecting the integrity of the gravel base material. This produces a hard, dust-free gravel road with little or no yearly maintenance.
- The aim is to provide a cost-effective, low-maintenance strategy for unpaved roads without compromising the safety of the road user as well as the integrity of the road pavement structure, without having to upgrade the road to black-top standards.

Strategies to maintain and prolong pavement life: Gravel road stabilisation



Strategies to maintain and prolong pavement life: Black-top pavements

- Several guideline documents exist for the design of bitumen stabilised materials (such as Sabita TG2).
- The aim of using this is that marginal in-situ materials can be used cost-effectively by in-situ stabilisation.
- Various stabilising agents are available, such as ordinary emulsion, foamed bitumen, polymers, and the use of Nano-Modified Emulsion (NME).
- These additives are normally introduced by means in-situ recycler machines (such as Wirtgen), or simpler, by adding the additives in the water truck.

SANRAL, in conjunction with their research panel, ENG4.0 @ UP and the CSIR are currently evaluating NMEs with the HVS.



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THANK YOU

