



Fit-for-Purpose approach to maintenance

Phil Paige-Green
(Paige-Green Consulting (PTY) Ltd)



BACKGROUND

- We have a major problem in South Africa with pothole patching
- Many fail prematurely
- Why??
- We are not addressing the causes or doing the repairs properly
- We need a “fit-for-purpose” approach



FIT-FOR-PURPOSE

- Many definitions
- “Fit-for-Purpose means that ***materials and assembly quality*** are of good quality as generally accepted within the industry and sufficiently durable to render the deliverables fit for the purpose specified without giving rise to the need for repair or changes within the Defects Liability Period

(<https://www.lawinsider.com/dictionary/fit-for-purpose>)



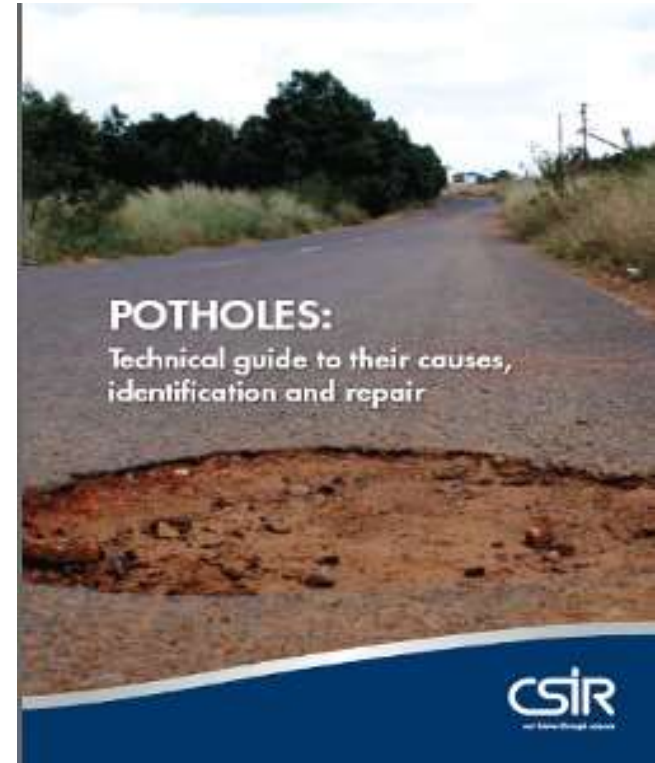
WHAT IS THE SOLUTION ?

- Identify the cause of the pothole and classify repair type
- Address the cause first – solve the problem.
- Repair the pothole using the most appropriate and effective method and materials



IDENTIFY CAUSES

- Pothole manual developed by CSIR in 2010.
- Widely publicised and many hundreds of people attended training courses countrywide
- Still not being implemented properly
- Poor training, supervision and control



IDENTIFY CAUSES

- Manual describes all common causes of problems
 - Asphalt
 - Thin seals
- Uses simple key to identify and classify these causes
- Basic engineering knowledge based on visual inspection – no testing required





Table 1: Key to decision process for repair of potholes

Key	Defect	Repair action	Go to
1	Surfacing is asphalt		2
	Surfacing is thin bituminous seal		4
2	Pothole is deeper than asphalt wearing course		3
	Bottom of pothole is within asphalt wearing course	<i>Shallow asphalt (HMA or cold mix)</i>	
3	Pothole caused by cracking due to fatigue of asphalt	<i>Deep repair after sub-soil drainage installation</i>	
	Pothole caused by localised surface water ingress with no associated crocodile cracking	<i>Medium depth asphalt repair</i>	
4	Pothole has exposed an unstabilized base		5
	Pothole has exposed a stabilized base		10
5	Pothole is not associated with cracks		6
	Pothole is associated with cracks		8
6	Pothole affects seal and top of base only (< 50 mm)	<i>Shallow surface repair</i>	
	Pothole extends > 50 mm into base		7
7	Pothole affects only the base	<i>Medium depth repair</i>	
	Pothole extends below the base		8
8	Pothole does not affect entire pavement structure (only base and subbase)	<i>Medium depth or deep repair</i>	
	Pothole affects entire pavement structure		9
9	Pothole is the result of saturated subgrade or support	<i>Deep repair after sub-soil drainage installation</i>	
	Pothole is the result of poor material – no evidence of excessive subsoil water	<i>Deep repair</i>	
10	Top of base has carbonated and is weak		11
	Top of base has not carbonated excessively and is still strong	<i>Shallow surface repair</i>	
11	Pothole is associated with crocodile cracking	<i>Deep repair</i>	
	Pothole is not associated with crocodile cracking	<i>Medium depth repair</i>	














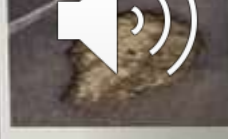
Surfacing is asphalt > 2		Surfacing is thin bituminous seal > 4	
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Pothole is deeper than asphalt wearing-course > 3		Bottom of pothole is within asphalt wearing-course Shallow asphalt (HMA or CMA)	
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Pothole caused by cracking due to fatigue of asphalt Deep repair after sub-soil drainage installation		Pothole caused by localised surface water ingress with no associated crocodile cracking Medium-depth asphalt repair	
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Pothole has exposed an unstabilised base > 5		Pothole has exposed a stabilised base > 10	
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Pothole is not associated with cracks > 6		Pothole is associated with cracks > 8	
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6 Pothole affects seal and top of base only (< 50 mm) Shallow-surface repair		Pothole extends > 50 mm into base > 7	
7 Pothole affects only the base Medium-depth repair		Pothole extends below the base > 8	
8 Pothole does not affect entire pavement structure (only base and sub-base) Medium-depth or deep repair		Pothole affects entire pavement structure > 9	
9 Pothole is the result of saturated subgrade or support Deep repair after sub-soil drainage installation		Pothole is the result of poor material – no evidence of excessive sub-soil water Deep repair	
10 Top of base has carbonated and is weak > 11		Top of base has not carbonated excessively and is still strong Shallow-surface repair	
11 Pothole is associated with crocodile cracking Deep repair		Pothole is not associated with crocodile cracking Medium-depth repair	



RECTIFY THE CAUSE OF THE PROBLEM

- Most problems relate to water – leakage, infiltration, drainage, etc.
- Other causes are weak subgrades, lack of maintenance (crack-sealing, stone loss), overloading, service trenches, etc.
- Tackle these first
- No point in patching it - it will recur.



REPAIR

- Basic repair types described

Depending on classification – 8 types of repair

HMA

THIN BITMINOUS SEALS

Shallow

Medium Depth Repair

Deep Repair

Deep Repair with Subsoil Drainage

- Repairs differ for type of failure
- Not one size fits all



PATCHING

- Repair should be as similar to surrounding area as possible
- For deep patches replace failed materials with new similar materials – particularly permeability
- Don't fill the entire hole with asphalt
- Seal edges – they will crack



REPAIRS



- Clean out hole to required depth
- Replace layer by layer (gravel, stabilised materials or crushed stone) after “moistening” side of hole
- Compact properly at OMC to highest density possible (at least same as design)
- “Paint” with emulsion before placing bituminous material
- Use cold-mix or asphalt for top 40 to 50 mm only (unless bituminous base)
- Compact this and seal joins with geotextile ribbon



BITUMINOUS MATERIALS

- Cold mixes – comply with Agrément requirements (preferably have an Agrément certificate)
 - Some maintenance contractors have their own tried and tested materials – guarantee ?
- HMA - locally proven mix design
 - Problem is keeping it hot during multiple patching
- Requirements are durability, adhesion, stiffness and permeability.



SUMMARY

- Don't waste money
- Both materials and construction must be “fit-for-purpose”
- Need proper training



Thank you

paigegreenconsult@gmail.com

